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Strategies for tutoring written expression in students with ADHD and learning difficulties

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**STRATEGIES FOR TUTORING
WRITTEN EXPRESSION
IN STUDENTS WITH ADHD AND LEARNING DIFFICULTIES**

by Josephine Bishop (B. Ed. hons. one year conversion)

**A Thesis Submitted in Partial Fulfilment of the
Requirements for the Award of
Bachelor of Education with Honours (Special Needs Education).**

**At the Faculty of Community Services, Education, and Social Sciences,
Edith Cowan University, Churchlands Campus.**

Date of submission: June 30, 1999.

Abstract

ADHD and learning difficulties are associated with limitations in working memory capacity which may disrupt performance of writing skills. This thesis investigated teaching strategies to improve story-writing skills in five students with ADHD and learning difficulties in writing. The strategies were based on the view that these students would write more effectively if the task imposed fewer constraints on working memory capacity (the ability to store information while performing a task).

Students were taught to write stories under time constraints using the PW2R approach of five minutes to plan, five to draft and five to review. Students planned orally during the first few weeks, then learned to plan by writing their ideas into a web diagram. Students finally learned to plan by using teacher-prescribed headings denoting conventional story structure. The 12 story elements were written into a “wheel” shaped diagram, forming the prompt for students’ ideas on the set topic.

Specific gains were linked to the introduction of two spatial planning strategies. Four students wrote longer stories containing more ideas when using the self-generated web strategy, and four students wrote stories containing more story elements using the wheel strategy which incorporated story elements. Two students maintained gains regardless of strategy use, and two maintained gains only when using the written planning strategy. It appears that individual differences should be taken into account in instruction and task design, and that task modification can help to improve the quantity and quality of writing.

Results showed that students improved written expression skills after less than 15 hours of instruction, distributed across a 20-week period. Overall progress may be linked to teaching factors held constant, such as simplifying the writing task into component sub-tasks, individualising instruction and providing graduated prompts, facilitating accurate, guided and independent practice, and providing specific feedback.

(iii)

Declaration

I certify that this project does not, to the best of my knowledge and belief:

(i) incorporate without acknowledgement any material previously submitted for a degree or diploma in any institution of higher education.

(ii) contain any material previously published or written by another person except where due reference is made in the text; or

(iii) contain any defamatory material.

Signature _____

Date 1/9/99

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CHAPTER ONE

INTRODUCTION

Preamble

Jack was 15 years old and had always found schoolwork difficult, struggling to get through academic tasks in class each day. In mid-year, he found work experience in an auto repair shop. He loved the work. Supervisors praised his early efforts, saying he showed genuine ability. He sat a state-wide metal trades exam and obtained over 60% for the mechanical aptitude test. He got 30% for English. He could not get an apprenticeship.

Tom was 14 and in trouble with his English teachers. He was bright and did well at maths. Yet he could not string more than three sentences together to write an essay. Teachers complained that he was not trying hard enough. One punished him for a two-sentence essay seen as “flippant”. Tom’s difficulties continued. It was hardly a surprise that he went on to fail the language-based Tertiary Entrance Examination subjects that he was required to take in Year 12. Disillusioned with study, he began work as an itinerant labourer. Many years later, Tom won a scholarship to study at university.

These two students were educated in educational systems 25 years apart. What do they have in common? Firstly, Tom and Jack had ADHD. Teachers are becoming increasingly familiar with Attention Deficit Hyperactivity Disorder (ADHD), a medical condition commonly estimated as being present in some 3 to 5% of the school-age population. It is classified as a behavioural disorder under the Diagnostic and Statistical Manual IV (DSM IV) and currently includes a hyperactive/impulsive subtype (HI), an inattentive subtype (IA) and a combined subtype (CT) (refer to Appendix A). Tom and Jack shared a further problem. Both were disadvantaged by a learning difficulty affecting writing skills.

Learning Difficulty

The terms “learning difficulty” and “learning disability” are often used interchangeably. Both terms will be used in this thesis, so the differences should be clarified. Much of the U.S. research refers to “learning disability”, while the local Western Australian students participating in this thesis are described as having “learning difficulties”. The Australian National Health and Medical Research Council (ANHMRC, 1990, p. 2) defines “learning difficulty” as a “generic term for problems with learning” affecting 10 -16% of schoolchildren. “Learning disabilities” is a subgroup of “learning difficulties”, affecting only about 2 - 4% of students.

Three criteria help to determine whether a writing problem constitutes a learning disability (LD). Firstly, a learning disability has an innate psychological cause (Lerner, 1997), to the exclusion of environmental factors, intellectual or physical disabilities, sensory deficits, or emotional disorders. A learning disability is a disorder in “one or more of the basic psychological processes involved in understanding or in using language, spoken or written” (U.S. Individuals with Disabilities Education Act, cited by ANHMRC, 1990, p. 2). These psychological processes are cognitive variables constructed to explain how information is perceived, processed and remembered. Students with learning disabilities may reverse words, letters and maths symbols. Affected domains include “directional confusion, sequencing and short-term retention difficulties” (ANMHRC, 1990, p. 2).

Secondly, a learning disability is characterised by a severe discrepancy between a child’s general ability and his or her actual achievement, compared to same-age peers, delaying the acquisition of specific skills such as reading and/or writing. A significant gap between expected and actual learning is commonly interpreted as two standard deviations or two years below the average for peers of the same age (Anderson, Williams, McGee, & Silva, 1987, cited in Cantwell & Baker, 1991).

Thirdly, a disability is “lifelong” (Hammill, 1990, p. 77), and is not “amenable to change” (Hodder, Waligun & Willard, 1986, p. 3). The core cognitive deficits will persist and can be detected in unfamiliar subject material, despite remedial teaching to improve academic results.

The broader term, “learning difficulties”, recognizes that teaching practices and a range of other factors contribute to academic skill deficits. For example, a child with ADHD and a learning disability (LD) may lag behind classmates in reading or writing achievement due to intrinsic factors associated with the two conditions, problems at home and at school, and a curriculum which imposes unrealistic demands upon that individual. The focus is on the interaction between factors innate to the child, and environmental factors such as educational opportunity (ANHMRC, 1990).

Consistent with W.A. Education Department policies, participants in this thesis were described as having learning difficulties. Consistent with ANHRMC views, the potential impact of environmental and intrinsic factors was considered in reviewing the research literature on ADHD and writing difficulties.

Attention Deficit Hyperactivity Disorder

ADHD is characterized by frequent inattentive and/or hyperactive and impulsive behaviour compared to that of same-age peers. Symptoms may affect learning and motivation. Inattentiveness means difficulty in the ability to “*focus*” or prepare to pay attention (also called “motor pre-setting”), “*select*” the stimuli, “*sustain*” the effort of attending, “*resist* distractions (and) ... not be influenced by internal or external stimuli”, and “*shift*” attention “to a subsequent activity as the context requires” (Fowler, 1992, p. 13, my italics). Inattentiveness is shown by symptoms such as:

- poor sustained attention (vigilance),
- changing to a new activity before completing the previous one,
- disorganization in multi-step and unfamiliar tasks,
- erratic productivity,
- being easily distracted,
- transition problems such as tardiness,
- daydreaming,
- forgetfulness,

- poor listening skills, and
- failing to complete work, especially if interrupted.

Hyperactive and impulsive symptoms involve a difficulty in stopping, thinking, and reasoning through a situation” and an “inability to inhibit behaviour or delay making a response” (Fowler, 1992, p. 13). Symptoms include:

- constant movement, such as fidgeting,
- excessive talking and interrupting,
- impatience, noisiness, and poor self-control,
- poor interpersonal skills and difficulty recognising social cues,
- overreacting, and being easily frustrated.

Medication has been found to be an effective treatment for children to manage the symptoms of ADHD. However, the aetiology underlying the condition is not yet agreed. Three theories about ADHD appear relevant to educators, because they predict how the environment can affect symptoms in the classroom. They explain how and why a child with ADHD may react to specific extrinsic factors. This information can help teachers to provide such students with an environment which is conducive to learning. All three theories have empirical support and trace ADHD to physiological dysfunction affecting thinking and behaviour.

The *effort-activation* model proposes that ADHD is primarily caused by an impaired ability to regulate arousal (Oosterlaan, Logan, & Sergeant, 1998; Tannock, 1998). Physiological factors are involved in remaining alert. Arousal is a “general (organic) state ... that affects the ability to carry out various functions of attention, including vigilance” (Wood, 1988, p. 330). European researchers view inattention and motivation difficulties as secondary symptoms of ADHD. Current research shows that children with ADHD are able to attend to tasks under certain conditions, such as when they are highly motivated, but that they must make more effort to focus attention compared to children without ADHD (Jennings, Van Der Molen, Pelham, Brock-Debski & Hoza, 1997). This model is continuing to be refined.

Zentall's *optimal stimulation* theory argues that ADHD is caused by a biological predisposition to underreact to stimuli. Again, this is an arousal regulation problem. Greater stimulation is needed in order to stay alert (Zentall, 1993). For example, children with ADHD may notice a beautiful blue butterfly outside the classroom window rather than the dull math test on their desk, or they may move around to keep their muscles busy and remain alert. Performance improves if the environment helps to maintain arousal through novelty and physical activity.

Barkley (1997a) argues that ADHD is caused by *disinhibition* - a deficient behavioural inhibition system (BIS). Normally, the BIS stops children from acting inappropriately, allowing them to complete self-mandated tasks. It delays responses, allowing time to anticipate, analyse and evaluate prior to actions. The BIS helps focus attention on "relevant environmental cues" and control behaviour (Quay, 1997, p. 8). It affects, and is affected by, arousal levels. To put it crudely, a lax BIS cannot stop "gut reactions" (automatic and prepotent responses to stimuli) as quickly as it does for the majority of people. For example, a child may be unable to control the impulse to look at that butterfly. The deficient BIS impedes memory, information processing and self-control in specific ways, as shown in Appendix B. Disinhibition increases when students are fatigued or unsupervised, when rewards are delayed or when they must choose between conflicting demands (Barkley, 1997a).

ADHD and Learning Difficulties

Many children who are diagnosed with ADHD also experience learning *difficulties*. Zentall (1993) cites research findings that 80% of 11-year-olds with ADHD were over two years behind in reading, spelling, maths or written language (Anderson, Williams, McGee & Silva, 1987, cited in Zentall), and that over a third failed to finish high school (Weiss & Hechtman, 1986, cited in Zentall). ADHD has been linked to high rates of grade retention and suspension from school (Barkley, Fischer, Edelbrock & Smallish, 1990, cited in McKinney, Montague & Hocutt, 1993) and frequently accompanies specific language impairments (Riccio & Hynd, 1995).

ADHD by itself is not a learning disability (LD). DSM-IV classifies ADHD as a behavioural disorder. Individuals may be diagnosed with both ADHD and LD. Co-morbidity statistics vary according to the sampling criteria used by the researchers at the time the data were collected. Recent reviews suggest that about 20% of students with ADHD may also have co-morbid learning *disabilities* (Tannock, 1998; Riccio, Gonzales & Hynd, 1994).

A learning disability is determined by evaluating specific academic skills. ADHD is determined by evaluating behaviours. Skill deficits may contribute to poor motivation, and vice versa, disrupting academic task performance independently or in combination. For example, persistent behaviour problems could limit practice in basic skills such as handwriting and spelling, and this reduction in hand-writing and spelling practice could exacerbate a co-morbid learning difficulty. Wong (1998) reported that students with learning difficulties have been found to require eight times the amount of practice needed by average students to develop fluent written expression.

Several studies have found that ADHD compounds language problems in students with learning disabilities. Felton and Wood (1989) conducted a series of studies at primary school level, reporting that students with ADHD and Reading Disability (RD) had the difficulties associated with both conditions. Students with ADHD and ADHD/RD had difficulties in remembering the sequences of spoken words and in aural prose recall tasks. In students between 8 and 12 years of age, ADHD (with or without RD) was associated with poor aural memory, rote (verbal) learning difficulties, and limited verbal fluency “on demand”. Whether they had ADHD or not, students with RD demonstrated poor word retrieval skills, phonological awareness problems and rapid automatized naming deficits. A rapid, automatized response is an instant reaction to a word as a whole unit rather than as a sequence of sub-units to be decoded. Such “automaticity” is essential for fluent reading. The ADHD/RD group mean scores were *below* the RD-only mean scores in rapid automatized naming tests, verbal fluency and auditory verbal learning.

August and Garfinkel (1990) also found that students with ADHD/RD showed difficulties associated with both conditions. Students with ADHD performed poorly on tests measuring attention, listening, impulsivity, and organised planning (using a test based on moving squares to uncover a pattern in a grid). Children with RD performed poorly in rapid word naming, and in a vocabulary measure supplying opposites to stipulated words. The co-morbid group performed poorly on rapid word naming, vocabulary, attention, listening, planning and impulsivity. Older students with ADHD/RD tended to have very poor spelling skills, while their younger counterparts consistently demonstrated reading difficulties.

Interventions for students with ADHD may seek to improve students' behaviour in the classroom, e.g., rule compliance and time on-task. These improvements may not necessarily ensure academic gains. Two factors could contribute to this. Firstly, classroom interventions may not take into account the full range of ADHD symptoms. Disinhibition, arousal difficulties and inattentiveness may affect memory, perceptions of time and organisation of data, disrupting academic performance under certain conditions (Barkley, 1997b). For example, students with ADHD are often termed "trial and error" learners who can't anticipate mistakes or impose routine structure on tasks (Fowler, 1992). Effective teaching may involve flagging potential pitfalls in new tasks, structuring content for students, and keeping verbal instructions brief. However, such strategies will not be sufficient to accommodate the needs of students with ADHD and specific learning difficulties.

This leads to the second factor which could prevent academic gains. ADHD symptoms may mask the presence of a specific learning difficulty or learning disability. Berninger and Stager (1996, p. 6) warned that language disabilities "particularly in writing, are often undiagnosed and untreated" in students with behavioural disorders, and that intervention is commonly aimed only at behaviour. This concern was shared by Riccio and Hynd (1995). Language problems require intervention aimed at the knowledge and skill deficits. The student may benefit from extra assistance, such as "one-to-one" tutoring (either within, or outside, class time).

Planning Strategies

Written expression demands co-ordination of handwriting, spelling and punctuation skills, together with syntax, vocabulary, topic and genre knowledge, for the purpose of communicating ideas about a topic. This is the written product sought by teachers. It is obtained by issuing instructions to the student. Instructions may be spoken, modelled and/or written into lesson materials. Narrative compositions are elicited by cues (“task stimuli”) such as story titles, pictures, story-starters, story-enders, set topics, group stories, timed writing, term projects and worksheets.

Students with learning difficulties may be assigned tutors to help make such tasks more manageable. Often, tutors teach a task by reducing it to a number of simpler subtasks. These subtasks can be joined, eventually, to enable the student to perform the whole task. Research strongly supports this remedial teaching principle (Swanson, O’Shaughnessy, McMahon, Hoskyn, & Sachse-Lee, 1998), although neglecting potential applications to teaching written expression. Written expression can be split into component skills. Research supports the separate teaching of hand-writing and spelling skills, but provides less support for teaching other components in isolation from the context in which the writing skills are required (Lesiak, 1992). It may be more useful to split the task of written composition into subtasks based on the stages of planning, drafting and revising. This is consistent with the current research focus on teaching skilled writing processes to students with LD.

Students can integrate the skills in each stage and address deficits within the context of the whole task. Teachers can emphasise one part of each subtask, such as drafting an appropriate number of sentences, or may correct weak skills in one subtask. Flower and Hayes (1980) suggested simplifying the writing process by breaking a set topic into sub-problems, setting priorities about satisfactory levels, and by planning. They favoured planning as a strategy because it can be done quickly, yet is flexible enough to be used in a variety of tasks. Planning sets goals, focusing on the essential issues to be communicated and giving a “steady reference point” to resume course after struggling with sentence construction and other constraints.

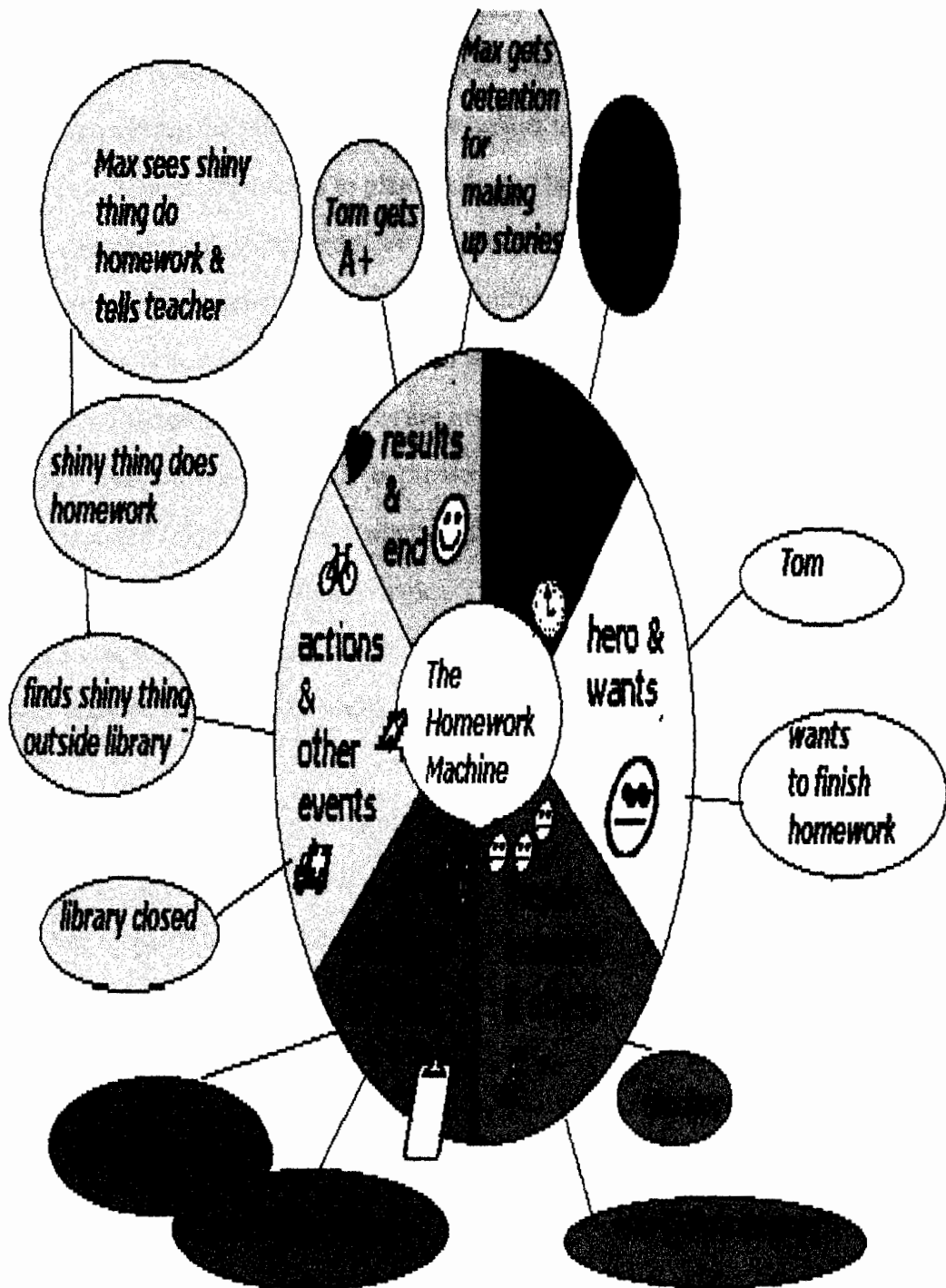


Figure 2. Story grammar wheel

A third planning method uses a pre-structured diagram which contains a story grammar framework to guide idea generation (refer to Figure 2). This assists students who cannot think of ideas to write about, since it uses a number of conventional story headings to cue students' ideas. Students may be unsure about

what to include in a story, if they have read very few narratives and cannot recall many of the features of oral narratives read to them in junior primary school.

When setting the planning subtask, teachers may tell students how to plan. Task materials may prompt students to plan orally, to “brainstorm” ideas into a web, or to list topic ideas next to stipulated story elements. This thesis will focus on the effects of the spontaneously generated web and pre-structured wheel planning strategies as interventions for teaching story-writing to students with ADHD and written expression difficulties. These effects are investigated by measuring four specific dependent variables: story length (expressed as the number of words), the number of ideas generated (expressed as the number of propositions), the number of story elements, and relevance to topic. Single subject data will show the extent and rate of change in these variables as students write a series of orally planned stories, a series of web-planned stories, and a series of stories planned from story grammar wheels.

Purpose

The research has two aims. The first aim is to compare the effects of the written plans (web and story grammar wheel) with unstructured oral planning on written expression. The effects will be compared within the following context. The three writing subtasks (planning, drafting and revising) will be taught using one-to-one instruction, guided and independent practice, and immediate feedback. Interventions will vary the planning subtask. Oral planning will be used to establish a baseline, and students will then learn to write plans as structured and unstructured spatial outlines. Written plans are expected to reduce the demands of the writing process, compared to oral plans. It is intended that students will write stories with more words, ideas, story elements and relevance, when using a written (rather than oral) planning strategy.

The second aim is to compare the effects of the two written planning strategies. Students will write their own story ideas as a web diagram. This strategy is intended to improve the relevance and length of students’ stories. The wheel plan requires students to use specific headings derived from the narrative genre, and is

aimed at improving the structure of stories. Students are expected to write more words and ideas, and more relevant stories when planning with self-generated webs rather than wheels, since story grammar is considered a relatively demanding task. Regardless of this, students should be able to write more story elements when using the wheel strategy, because this form of planning identifies story elements and leads students to apply story grammar to their compositions.

Thesis Significance

This thesis investigates remediation of written expression difficulties in students with ADHD. This is an area which has not been well documented in the special education research literature, so there is little empirical data about teaching methods to assist these students. Writing skills should be remediated prior to Year 10, when career decisions are made. Difficulties in written expression can limit and bias choices about post-school options. Students waste their potential by failing or dropping out of high school, and then discover that literacy skills are necessary in the workforce. Poor literacy hinders dealings with companies, government departments and hospitals, and restricts access to legal rights.

Specialised remedial programs aim for the rapid onset and transfer of learning gains. However, creative writing improvements tend to be gradual and noticeable improvements may take many months (Wong, 1998). More research is needed to analyse how teaching strategies may improve the extent and rate of gains in written expression in students with learning difficulties. Single subject research can help by showing the interaction between task demands, instruction procedures and learning outcomes over a short period of time. Immediate gains could occur if the writing task was less demanding. This does not mean that these students will gain confidence, but learn less from such a task. Rather, the outcome could be that they begin to improve the length and quality of their stories. For example, when given a topic and time constraints, students could use specific strategies to help them write a minimum number of relevant words in a form which is recognizable as a story (according to

stipulated criteria). This thesis measured individual progress in such strategy use.

Zipprich (1995) points out that researchers in special education have not investigated the effectiveness of using self-generated (spontaneous) or teacher-generated (pre-structured) spatial plans. Spontaneously generated plans (webs) may be an easy method for students to juggle writing task demands and creatively elaborate on their own story ideas. On the other hand, a teacher-generated planning strategy could help students to write in a more structured way, with a spatial format assisting students to memorize and apply the expected conventions of story-telling. This thesis evaluates these two planning techniques for students with ADHD and writing difficulties, documents the immediate and longer term effects on story writing for individual students learning these strategies, and offers reasons for these effects.

Definitions

The following definitions explain some of the terms used in this thesis.

Attention Deficit Hyperactivity Disorder (ADHD)

Attention Deficit Hyperactivity Disorder is a medical condition affecting about 5% of schoolchildren, causing chronic inattention and/or hyperactivity and impulsivity, when compared to same-age peers (refer to Appendix A).

Learning Disability (LD)

This is a disorder which “significantly affects acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities (and is) intrinsic to the individual, due to central nervous system dysfunction ” (NJCLD, 1988, cited in Hammill, 1990, p. 77). A learning disability may be affected by behavioural problems and environmental influences, including inappropriate instruction.

Reading Disability (RD) is a learning disability which impairs learning to read.

Genre

A genre is a conventional style and structural framework associated with a specific writing purpose. First Steps (1994) lists six writing genres: recount (describing past events); narrative (telling a story); procedure (describing how to do something); report (describing specific phenomena); explanation (explaining specific phenomena) and exposition (argument or persuasion to specific viewpoint).

Story Grammar

This is also called “narrative genre”. It refers to “a person’s conception of how a story is organised into a structure with components that are logically related” (Martin and Manno, 1995, p. 139). These are called story elements. Stein and Glenn’s framework (1979, cited in Hendrick-Keefe & Hoge, 1996) suggest eight story elements: setting, initiating event, goal (internal response), attempt at goal attainment, consequence and outcome, reaction and ending. First Steps (1994) simplifies these to six story elements within five broad categories: Orientation (Time and Place), Characters, Complication, Story Structure (Events and Actions) and Resolution.

Discourse Knowledge

Discourse knowledge is knowledge about how to write, that is:

- (a) knowledge of processes such as planning, drafting and revising,
- (b) whole text-level knowledge, such as genre, theme and reader awareness, and
- (c) sentence-level knowledge, such as syntax and vocabulary

Spatial Outline or Plan

Also called “graphic organisers,” these diagrams contain words which summarize text. The relative positions of words and symbols show relationships between ideas in two-dimensional space e.g. hierarchies, similarities and differences. Examples include tree diagrams, matrices, and clustered circles (Robinson and Schraw, 1994).

Web (refer to Figure 1)

A web is a spatial plan drawn by a student prior to writing a composition. The students write the topic in the centre of the page, circle it, then write related ideas around the topic. This procedure is often called “brainstorming” or “clustering”. The web may be used as a teaching method or as an ongoing writing strategy. In this thesis, the self-generated web is distinguished from the teacher-structured spatial plan by using the “wheel” label for the latter.

Wheel (refer to Figure 2)

The wheel was adapted from the web for this thesis, but is based on standard pre-structured webs or story maps containing the story elements typical of the narrative genre (Zipprich, 1995; First Steps, 1994).

The wheel diagram used in this thesis contains 12 story elements typical of the narrative genre. The students write the story topic in the centre of the page, like the hub of a wheel. The topic is circled and the six headings are written around this circle, like spokes. A larger circle is placed around the headings, like the rim of a wheel. Students write their ideas next to each heading, branching outwards from the wheel shape.

Working Memory (WM)

This memory system temporarily recalls and uses information seen or heard in the immediate environment and from long-term memory. The ability to store data (primary recall task) while retrieving other items (secondary processing task) is called working memory capacity. Encoding is the input of data into WM storage. Retrieval is its collection from storage and expression in a task. The three components in working memory are the phonological loop, the visuospatial sketchpad, and the central executive (Baddeley, 1997).

Executive Control

This is broader than the central executive component in working memory. Executive control involves the “self-regulatory processes which are responsible for the organisation and monitoring of information processing, mobilizing attention and inhibiting responding ... i.e. doing what is known” (Purvis & Tannock, 1997, p. 141). Working memory, reasoning and arousal processes help achieve executive control (refer to Appendix B).

Fluency

This is defined as the “capacity to rapidly and accurately assemble diverse units of language into messages for others” (Barkley, 1997a, p. 253). Fluency affects verbal or written language skills.

Thesis Overview

Chapter 2 reviews research literature relevant to teaching written expression to students with ADHD and learning difficulties and then formulates specific hypotheses predicting learning responses. The research and teaching methods are described in Chapter 3. Chapter 4 outlines individual results and overviews the data for the five participants in this research. Chapter 5 discusses the effects of the web and wheel strategies, interprets findings and suggests future research directions.

CHAPTER TWO

LITERATURE REVIEW

This chapter defines components in the task of written expression and describes constraints experienced by struggling writers. Evidence is reviewed showing that working memory problems are associated with ADHD and LD, and contribute to writing difficulties. The final part of the chapter deals with teaching methods. Different types of instruction and task design have been found to affect academic performance in students with ADHD and LD. This research is reviewed to find potential “best practices” which may be common to both ADHD and LD groups. Theories on ADHD and working memory help to identify why specific teaching practices may be helpful. It is concluded that the writing task would be simplified by using subtask routines and a spatial format for planning, to minimize the effects of working memory problems on written expression. Tutoring strategies are developed from this premise.

Writing Subtasks & Constraints

As students write a story, they visualise images, think about words, and weave ideas together. Four *subtasks* have been identified within the expert writing process: planning, drafting, reviewing and monitoring (Hayes & Flower, 1980). The process is outlined in Figure 3. Each subtask makes distinct demands on a writer.

In *planning*, students generate and organize ideas, and set goals. The next subtask is to write or translate ideas into a draft text. This requires taking ideas from plans, expressing them as sentences, and searching for related ideas. In this thesis, this intermediate subtask is referred to as *writing or drafting* (not “translation”), to prevent confusion with the terminology used for higher order skills. The third subtask is *reviewing*. Writers read and edit their written words. They correct spelling or punctuation errors, clarify or revise meaning and assess the likely effectiveness of the writing.

Writers must also *monitor* these subtasks. They evaluate their own use of the three subtasks and decide when to shift between them. These decisions are prompted by recognising when a subtask has been satisfactorily completed. Expert writers choose the sequence and duration of each subtask, and may proceed back and forth between them rather than perform each subtask in order.

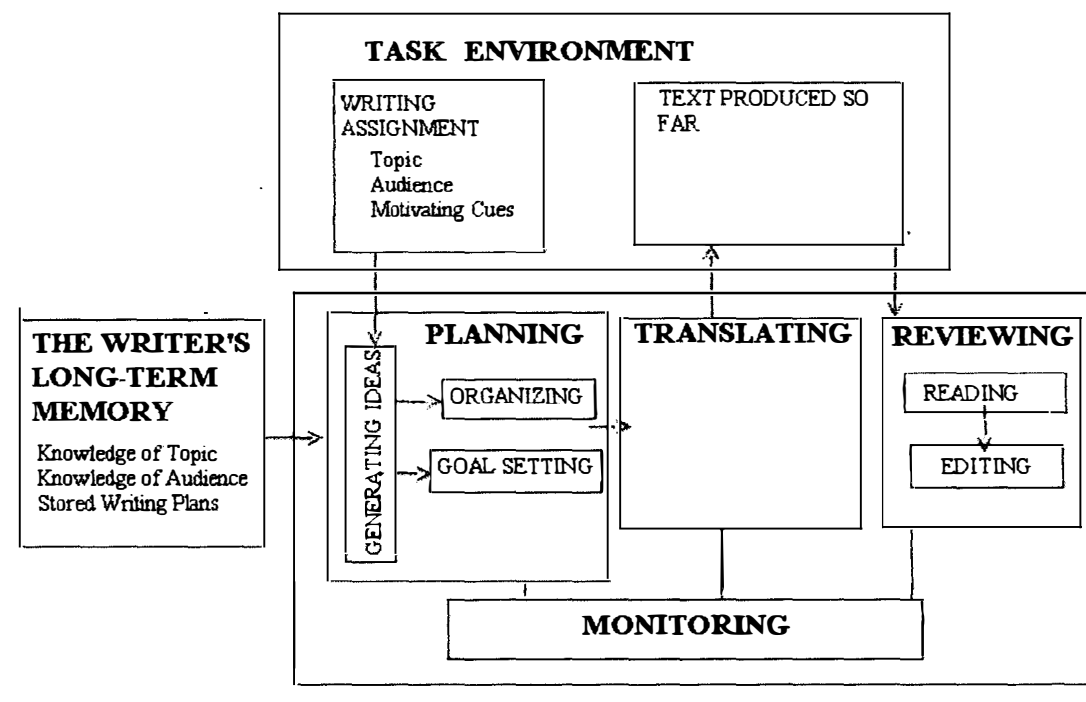


Figure 3. The writing process (Hayes & Flower, 1980, p. 11).

The writing process is limited by a number of constraints. Flower and Hayes (1980) describe three types of task constraints: *understanding of the task*, *knowledge and language skills*. Each of these will be considered in turn. When beginning a task, a writer forms an understanding of what is required. A student may write a superb essay, but it may not be relevant to the task which has been set. The writer's interpretation of task requirements is referred to as the "rhetorical problem" (Flower & Hayes, 1980) and encompasses students' expectations about the readers, the intended purpose of the composition, and the anticipated role of the writer. A student's grasp of these parameters governs the written response.

The second task constraint is topic and discourse knowledge. Topic knowledge includes the various facts, principles, jargon and events associated with a specific writing topic, such as “Basketball”. This knowledge affects holistic writing quality, adding meaning and detail to writing (Benton, Sharp, Corkill, Downey & Khramtsova, 1995). Discourse knowledge is information about how to write, such as “grammar, punctuation, sentence and text structure” (Benton, et al., 1995, p. 67).

The final constraint is written language skill. This can be divided into *transcription* and *translation* skills. Translation requires writers to focus on word and sentence level skills (such as word choice and grammar) and also text level skills (such as constructing themes, morals and plots). Transcription involves the basic skills of handwriting, spelling and punctuation. This knowledge is learned by rote and applied mechanically. Once fluency is achieved, little conscious effort is needed to use transcription skills.

Translation, however, demands creativity, reasoning, decision-making, and ongoing effort. These “higher order” skills enable students to generate, evaluate and convert ideas into sentences. Swanson and Berninger (1996) argue that the translation of ideas can never become automatic, as the writer must always pay conscious attention to the “construction of ideas and representations”, generating meaningful content and using their skills in a purposeful way (p. 358).

While researchers differ in opinion about whether grammar constitutes a translation or transcription skill, all agree that these two categories exist, and base the division upon the extent to which automaticity is or is not possible. Both higher and lower order skills must be developed in young writers. Teachers establish discrete objectives to improve either translation or transcription, but the student also needs to learn to integrate these skills into the one writing task.

Students must be mindful of task constraints while writing. Problems arise for students who cannot juggle sufficient constraints while engaged in the writing process. For example, they may forget the topic, limit their vocabulary use, or spelling and punctuation may lapse. Experts simultaneously balance the various task

constraints as they write. The capacity to “remember ... so as to do” (Barkley, 1997b, p. 272), relies upon a temporary storage system called *working memory* (WM). This is distinct from long-term memory, which holds knowledge about the writing topic, task procedures, and other matters, and represents what the student actually knows. A working memory deficit has the potential to limit students’ writing because it limits the expression of that knowledge. The concept will be described in detail because it helps to explain writing problems and analyse teaching strategies.

Working Memory

Working memory is a tripartite, interactive system enabling simultaneous thought and action, anticipation and reflection (Baddeley, 1997). The system could be likened to two storage tanks (the phonological loop and the visuospatial sketchpad) controlled by a switch (the central executive). Information is obtained from the immediate environment, briefly enters short-term memory (STM). It is then interpreted and elaborated upon by long-term memory (LTM) and is encoded into working memory (WM), where it is stored and used while performing tasks.

Storage and Processing

Working memory is measured by presenting a subject with a number of items to be stored (*primary recall task*), then asking subjects to manipulate and retrieve other items (*secondary processing task*). The stored items must be recalled after the interruption caused by processing. For example, subjects may listen to a series of words, answer a comprehension question, and then be asked to recall the words (Daneman & Carpenter, 1980, cited in Gathercole, 1998).

Some students may have difficulty retrieving the items that they have stored. Others may have insufficient WM capacity to store the items. If forgotten items can be retrieved through cues, students may have processing or retrieval problems, rather than a limited storage capacity (Swanson & Berninger, 1996).

Capacity and Domains

The amount of information which can be stored at any one time is limited by *WM capacity* (Swanson & Berninger, 1996). Beyond that limit, additional data cannot be stored “on-line” (Just & Carpenter, 1992, cited in Gathercole, 1998). Individual activation ceilings determine where capacity is fixed relative to peers. Learning difficulties are associated with limited capacity in working memory.

Storage occurs in two separate domains and in the central executive (refer to Figure 4). One domain stores sounds, like an “inner ear”. This is the *phonological loop* which encodes, processes and retrieves subvocalised words or “inner speech”. Encoding deficits in this system have been linked to early reading and writing problems (Gathercole, 1998). The other domain is the *visuospatial sketch pad*. It encodes, processes and retrieves spatial information, such as shapes, diagrams, locations and directions.

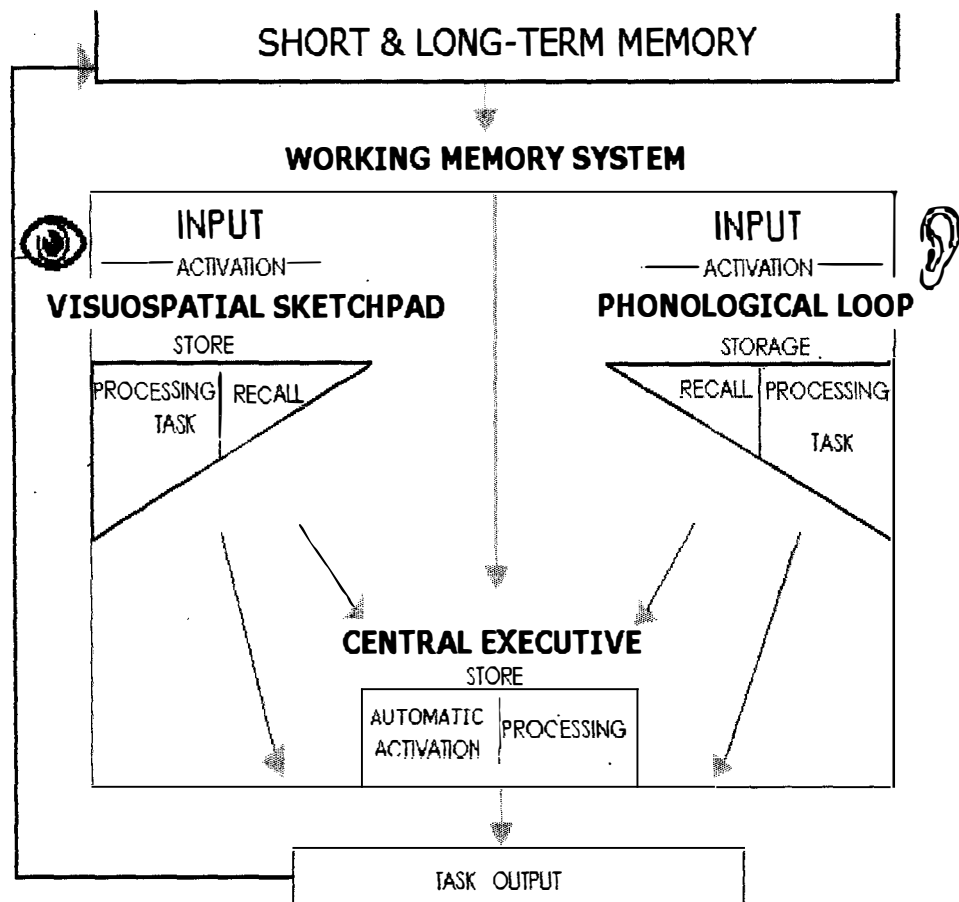


Figure 4. Working memory (Baddeley, 1997; Swanson, 1996; Gathercole, 1998).

Interference

Storage and processing share working memory resources. Time, processing difficulty or lack of familiarity with items may cause loss of stored memories (Turner & Engle, 1989; Towse, Hutton & Hitch, 1998). In young children, any processing task may erode storage. This is called generalised interference.

Domain Specific Interference (DSI) occurs from about 10 years of age (Hale, Bronik & Fry, 1997). From this age, each domain has its own resources. In DSI, a processing task which uses the phonological loop will only interfere with data stored in the loop, and a processing task tapping the sketchpad's resources will only limit recall of visuospatial items stored in the sketchpad. A processing task from one domain will not interfere with data stored in the other domain. For example, a student's stored memory of a diagram should not be eroded by interference from a processing task (such as writing sentences) which taps the phonological loop.

Central Executive & Automatic Routines

The central executive serves as a switch, blocking irrelevant and releasing relevant data to and from the two storage systems. This controls the timing and distribution of information within the WM system. A separate storage and processing function is assigned to the central executive to assist in this co-ordination role (Baddeley, 1997). Information from both domains can be integrated by the central executive and used for complex tasks.

In addition, the central executive controls the conscious activation and inhibition of *automatic* routines. These routines increase speed in repetitive tasks such as word recognition, facilitating fluent language use. Automatic routines require little effort to run, but efficient inhibition is needed to stop their continuation when circumstances are recognized as inappropriate. Disinhibition may impede cessation of routines. This problem could delay the acquisition of new skills if previously learned routines must be modified (such as in moving from print to cursive writing).

Chunks and Storage Demands

Working memory stores items of information as *chunks*, each chunk representing a recollected visual image or sound which may incorporate more or less detail, depending on familiarity with the data (Anderson, 1995). Capacity limits the number of chunks which can be held at once, but the amount of data per chunk can vary. Recall improves when the items presented to test subjects are identifiably within their field of expertise. Expertise may improve memory through “chunking” related to the learning process. Associated items are grouped together into one chunk and in this way, occupy less storage space (like compacting files).

Expertise may circumvent working memory limitations to improve recall in a specific area. Chi (1978, cited in Schneider & Pressley, 1989) compared child chess experts to adult novices. The adults performed better on standard digit span WM tests, indicating superior capacity. Although the children could store fewer chunks in working memory, they were better at working memory tasks using chessboard positions. Compared to the adults, the children stored more chess-related data in fewer chunks. Schneider and Pressley (1989, p. 27) conclude that “chunking can play an important role in mediating some types of memory performance differences”.

Fluency may help in increasing the amount of data held in each chunk. Samuels, La Berge and Bremer (1978, cited in Samuels & Flor, 1997) found that beginning readers stored words as meaningless letters in short-term memory while fluent readers stored whole words. This would not eradicate individual limitations in capacity, but could help to optimize existing resources. It is possible that writing task demands could also be reduced by expertise in topic or discourse knowledge. If this information was stored in fewer chunks, more WM resources could become available for storing essay ideas. Storage of data in working memory can be affected by familiarity with items, time requirements, and the number of manipulations in the processing task (De Jong & Das Smaal, 1995; Towse, Hitch & Hutton, 1998). These three factors broadly relate to knowledge and understanding of a specific subject, fluent processing, task complexity and decision-making.

Working Memory & ADHD/Learning Difficulties

Limited working memory capacity has been associated with learning disabilities and ADHD. Barkley (1997a) reviewed the research on this issue, suggesting that ADHD working memory deficits may be linked to task complexity. Complex tasks demand both executive control and use of full working memory capacity. Low levels of arousal may limit activation ceilings, reducing capacity (Zentall, 1993, Barkley, 1997a), while disinhibition disrupts the executive control needed to manage competing demands in difficult tasks. The problems could combine to undermine capacity in students with ADHD and learning difficulties.

This view is consistent with findings from Siegel and Ryan (1989), who tested working memory in primary-school students aged between 7 and 12 years of age, with and without ADHD and learning disabilities. Students listened to a series of sentences. The final word in each sentence was missing, and students had to supply an appropriate word to fill the gap (secondary processing task). There were sets of two, three, four and five sentences. After each set, students had to recall all the missing words in the sentences in that set (primary recall task). Students with a reading disability performed more poorly on this task than students in a control group. This difference did not decline as students aged, suggesting that working memory problems persist throughout primary school for students with learning disabilities. Fixed capacity limitations may explain the enduring difficulty.

ADHD was also associated with working memory problems, but only among the youngest students. The 7- and 8-year-olds with ADHD performed more poorly than a control group on the working memory task described above. Older students with ADHD did not show these deficits. As all students became better at this test with increasing age, the task was regarded as more complex for younger students. The temporary appearance of working memory deficits in students with ADHD coincided with the age at which students found the task most difficult.

The researchers suggested that “attention may be related to performance only on more complex memory tasks” (Siegel & Ryan, 1989, p. 978). There is a plausible (but speculative) explanation for this discrepancy. Both ADHD and LD may limit capacity, but the two conditions may be associated with slightly different types of working memory problems. ADHD is linked to difficulties relating to executive functions, while LD problems could include specific difficulties relating to the phonological loop. Students with ADHD may be able to compensate for their difficulties in some circumstances, but not in complex tasks (Barkley, 1997a). There are several differences between simple and complex tasks which are relevant to students with ADHD and learning difficulties.

In simple tasks, fluency could improve recall of primary test items by reducing the resources used by working memory for processing, thereby increasing the resources available for storage. Eventually, older students with ADHD (only) may develop more fluent language processing skills (such as reading) which could be used to minimize some of the effects of disinhibition. Greater familiarity with words or sentences could help them to remember such items in working memory. Students with learning disabilities may not improve fluency relative to peers, due to phonological awareness problems and/or persistent difficulties in rapid word retrieval, labelled an “automatic decoding deficit” (Yap & Van Der Leij, 1993).

In simple tasks, few decisions are needed and automatic routines can reduce the demands on the working memory system. In complex tasks, working memory is strained by many simultaneous, conflicting demands. The central executive must manage the movement of data, enabling the working memory system to store, synthesise and retrieve large amounts of unfamiliar information over extended time-periods. ADHD symptoms such as recurrent daydreaming, distraction and impulsive responses divert resources from encoding and storing task-related data. When a task demands storage at full capacity, even momentary lapses in attention may supersede information needed for a task. For example, glancing at a butterfly outside the classroom window may lead a student to forget the teacher’s instructions issued 5 minutes previously.

Distractions may limit storage of task-related items while writing compositions. Students may be unable to recall task purpose after the first few obstacles are encountered. Or they may be distracted during instruction time, preventing the encoding of task information. Ongoing distractions may reduce students' focus on the task. They may not be able to attend to neat hand-writing, spelling and punctuation, the squeaky pencil of their classmate, and the facts about the essay topic, all at the same time. After a short time, they may stop writing.

Fatigue normally impedes working memory in complex tasks. De Jong and Das Smaal (1995) reported that average performance on the Star Counting Test (a measure of central executive WM function) declined after sustained effort in storing and manipulating data. Working memory becomes less effective and "burns out" after a period of continuous effort involving the central executive. But students with ADHD may have to exert extra effort just to concentrate on a task.

This effort may be effective in simple tasks. Jennings, Van Der Molen, Pelham, Brock-Debski and Hoza (1997) found no significant differences between the performance of children with and without ADHD in a "stop-go" videogame-style task, requiring students to inhibit motor responses on cue. The children with ADHD did expend significantly more physiological effort than the control group, to sustain anticipation of the need to inhibit inappropriate responses. That is, the students with ADHD tried harder than the peer group to remain ready to act. This may have led to performance gains, but the simple task imposed few demands on working memory.

Complex tasks impose many diverse demands on working memory and more executive effort is needed than for simple tasks. If students cannot muster sufficient effort, working memory will "burn out" and the central executive will not function properly. These tasks will become vulnerable to distraction, impulsiveness and perseveration (Barkley, 1997b). Low levels of arousal and limited WM capacity would reduce students' ability to maintain stored data during complex tasks. Story-writing may be a complex task for students with ADHD/LD. Written expression requires juggling of constraints, storage of knowledge and ideas, fluent processing and retrieval of words, and control of writing movements.

ADHD & Writing Difficulties

There is little research on students with ADHD and early handwriting difficulties. Several studies link ADHD with early handwriting problems in some students. Sleater and Pelham (1986, cited by Barkley, 1997a) and Jordan (1992) note that ADHD can be associated with poor or immature handwriting. Lerer, Artner and Lerer (1979, cited by Peeples, Searls & Wellingham-Jones, 1995) characterise ADHD handwriting as containing various irregularities in letter formation, such as “size, shape, ... spacing, and ... placement on lines”, letter “reversals” and “omissions”, “frequent erasures or reworking”, “omissions”, and “slow speed” (p. 1244). These hand-writing characteristics seem consistent with theories about poor control of motor responses (Barkley, 1997a). Disinhibition may affect the acquisition of writing skills, although difficulties could continue for students with co-morbid ADHD/LD. Research has not yet clarified these issues.

There is even less research on higher order writing skills in students with ADHD and ADHD/LD. Resta and Eliot (1994) administered the Written Language Assessment Test (Grill & Kirwin, 1989) to 32 boys categorised as hyperactive and inattentive. Students were between 8 and 14 years of age. The normed test consisted of three short compositions, each from a different genre. They concluded that these students demonstrated poorer written composition skills than average for their age, and cautioned teachers not to rely on assessments with handwriting components and to minimize classroom handwriting tasks. They did not advise how to improve skills.

ADHD has been associated with difficulties in verbal problem solving, aural comprehension and oral story retelling, but researchers have not explored whether these difficulties extend to written language. Re-telling a story taps many of the same higher order skills needed in story-writing (e.g., organisation of ideas, vocabulary and sentence generation skills) and demands knowledge of a narrative framework. To be able to write stories, a student must know what a story is. This discourse knowledge may be delayed in students with ADHD who have had behavioural problems, aural recall problems or co-morbid learning difficulties.

Research has shown that ADHD is associated with various difficulties in oral recall of aurally presented narratives. Felton and Wood (1989) surveyed 800 first graders, finding that students with ADHD scored significantly more poorly than average students on a narrative prose recall task. Poor aural recall would hinder the early development of narrative genre knowledge in junior primary school. These students could have problems listening to stories and remembering story-lines when oral narratives are read to the class.

Tannock, Purvis and Schachar (1993) studied story retelling in children between 7 and 11 years of age. Participants were 30 boys with ADHD and a control group of 30. Students listened to two stories and retold them. The students with ADHD had difficulties in putting the aural information into an appropriate context as the story unfolded. They retold the stories in a confused and poorly organised way which was hard for the reader to follow. These students also provided less overall information, more inaccuracies and less cohesion, compared to the control group. These sorts of organisational and sequencing skills are needed for aural recall, oral story-telling and for writing stories.

A later study by Purvis and Tannock (1997) replicated and extended these results, again testing students aged between 7 and 11 years. This study is useful, as data were provided for students with co-morbid ADHD/Reading Disabilities (RD). Students were grouped into four categories: ADHD, RD, ADHD/RD and a control group. They were asked to listen to a folk tale and re-tell it. Records were kept of the number of sequence errors, misinterpretations, substitution errors and ambiguous references in the re-told story. Productivity was also recorded.

Stories by the students with co-morbid ADHD/RD were marred by low productivity and frequent story retelling errors, including disorganisation and incorrectly sequenced ideas. The students with ADHD/RD had both the deficits found in the ADHD group alone and those from the RD group alone, "suggesting that remediation should be directed to both types of difficulties" (p. 142). These difficulties parallel problems found in the writing of students with LD, such as organising, sequencing and producing a satisfactory number of words or ideas.

Working Memory & Writing Difficulties

The quality of written narratives has been associated with the listening-generation span of working memory (WM), according to Berninger, Cartwright, Yates, Swanson and Abbott (1994). To test WM, 300 primary schoolers had to "listen to a set of sentences, to answer a process question about those sentences, and then to generate written sentences using each of the last words in those sentences the examiner read" (pp. 170-1). To test narrative quality, students were asked to write a 5-minute story prompted by the cue: "One day___ (choose person) had the ___ (choose best or worst) day at school". Two assessors rated the quality of each story. Interrater reliability was .75. Poor story quality corresponded to poor scores in the listening generation span test. Working memory was implicated in narrative quality.

More recent research found that working memory capacity was strongly associated with higher order writing skills. Swanson and Berninger (1996) administered the Test of Written Language (TOWL) (Hammill & Larsen, 1988) and a sentence span (working memory) task to 50 ten-year-olds. Five TOWL subtests were significantly correlated with working memory, as seen in Table 1.

Table 1

Correlations between working memory/reading comprehension and writing skills.

TOWL SUBTESTS WORKING MEMORY READING COMPREHENSION

Contrived Knowledge

Vocabulary	0.03	0.18
Spelling	0.30*	0.45**
Punctuation/Style	0.24	0.28*
Sentence Combining i.e. syntax	0.31*	0.26
Logical Sentences i.e. semantics	0.32*	0.48*

Applied Skills

Thematic Maturity	0.30*	0.47*
Contextual Vocabulary	0.35*	0.22
Syntactic Maturity	0.27	0.35**
Contextual Spelling	0.22	0.17
Contextual Style i.e. punctuation.	0.18	0.37*

(Swanson & Berninger, 1996, p. 365)

Working memory was strongly related to higher order writing skills. Of the five subtests which were significantly correlated with working memory, only one reflected mechanical writing skill. This “contrived” subtest assessed spelling by requiring students to hear, remember and write complete sentences from memory. The other four subtests measured higher order skills. Two were “contrived” subtests, asking students to edit a series of prescribed sentences for meaning and syntax. The remaining two were “spontaneous” subtests based on a 15-minute written story. The Thematic Maturity subtest assessed topic ideas and genre conventions; the Contextual Vocabulary subtest measured the number of words which exceeded six letters.

Swanson and Berninger (1996) then investigated the relationships between overall writing skills and two specific dimensions of working memory (storage and processing). They administered the TOWL (Hammill & Larsen, 1988) to 63 poor-to-average readers and writers, between 9 and 16 years of age. Working memory tests were also conducted. Poor scores for working memory corresponded to low levels of writing skill. The next step was to compare the association between storage capacity and writing, when processing difficulties were excluded from the WM score.

Some of the students did not score well on working memory tests because they temporarily forgot the information even though it had been stored. To exclude this type of retrieval difficulty, prompts were issued to help students locate stored data. If students still failed to retrieve the items after being prompted to do so, it was assumed that the information had not been stored. The revised scores reflected storage capacity only. The correlation between written expression and working memory remained significant, despite this revision to scores. The exclusion of processing difficulties did not change the strong association between working memory and written expression. Dysfluent processing, alone, cannot explain poor higher order writing skills. Storage capacity remained an important factor in written expression skills.

Swanson and Berninger (1996) concluded that if a child had a limited storage capacity, he or she was likely to have poor writing skills, and suggested that

processing efficiency was not a critical factor in the link between working memory and written expression. The researchers indicated that most students write poorly, not because they lose data from working memory, but because they store insufficient information at one time. They juggle too few task constraints. This limits the number of ideas that they can keep on hand while writing, restricting access to topic knowledge, procedures, words and ideas. The result may be a paucity of story ideas when writing under time constraints, compared to peers without such problems. Lack of fluency, low arousal levels, disinhibition, complex task demands and other such factors, would be relevant to higher order writing skills to the extent that these erode the capacity available for storing chunks of task-related data in working memory.

Cues or “think-sheets” may be given to students to aid retrieval of story ideas, compensating for knowledge retrieval difficulties (e.g., disorganization and forgetfulness). This assumes that students can store sufficient task-related data to benefit from the cues. Students with capacity limitations may be unable to store enough data to integrate all of the writing task constraints. This limits access to cued (and other) information while writing. Complex retrieval cues could actually increase task constraints, because students must remember additional new terms as they write. If retrieval cues do not assist these students to improve the quantity and quality of written compositions, other tutoring strategies must be considered. The issue is how to develop higher order writing skills, despite difficulties affecting working memory capacity and written expression.

Developmental factors may explain how written expression problems evolve. Bereiter and Scardamalia (1987) suggested that working memory contributes to children developing fluent writing skills. At 9 or 10 years of age, children can hold a phrase in mind, write it and then pause to subvocalise the next phrase. The (processing) activity of hand-writing no longer interrupts retention of the words and ideas generated and stored in working memory (primary task). Writing becomes more fluent and planning increases from about 10 to 12 years of age. This occurs at about the same age as the development of Domain Specific Interference, a step towards the maturation of the central executive (Hale, Bronik, & Fry, 1997).

Children with learning difficulties may not progress in this way. Working memory and other difficulties may have disrupted the fluent development of early writing skills. If hand-writing does not become automatic, it will demand a greater proportion of already-limited working memory resources and effort. In mid-primary years, such students will not have begun to write and store phrases simultaneously, and will write more slowly than same-age peers without learning difficulties. Teachers expect 10-year-old students to write well-structured compositions. They presume that fluent handwriting skills have developed and that students can remember ideas and phrases while they write. At this age, however, the student with learning difficulties may not be equipped to meet the extra demands of these more complex writing tasks.

When a written expression task demands more storage capacity than a student has available, the resulting composition is likely to be poor. Bereiter and Scardamalia (1987) noted that writing problems occurred in average students when an unfamiliar task made too many new demands at once. Task materials increased the load on capacity, making it difficult to write well. Tetroe (1984, cited in Bereiter & Scardamalia, 1987) asked students to compose stories leading up to a teacher-prescribed sentence ending the story. Performance declined when task constraints were increased by setting more detailed story endings as writing topics. The more elaborate story-enders set more plot ideas than students could remember while writing. Success in devising a plot to meet the number of aspects cued by the task stimuli, directly corresponded to working memory capacity.

Bereiter and Scardamalia (1987) suggested three consequences if writers are unable to store ideas while writing. Firstly, “local coherence” may decline, with ideas “related to the topic but not to each other” (p. 151). Writing thus becomes less structured, lacking a framework. Secondly, writing may be repetitive and inefficient. A great proportion of text is irrelevant to genre purpose and writing effort is wasted. Thirdly, composition may be brief - even ceasing after the first idea is completed. These three suggestions are supported by research studies which identify various types of higher order writing difficulties commonly found in students with learning disabilities. This research will now be outlined.

Types of Writing Difficulties

Individual students may demonstrate one or more specific writing problems. For example, one student may have poor handwriting but not poor spelling, while another may have poor creative writing skills but adequate transcription skills (Berninger, Abbott, Whitaker, Sylvester & Nolen, 1995; Newcomer & Barenbaum, 1991). Writing skill deficits may be grouped into three categories:

- poor transcription or “mechanical” skills, such as slow or poorly formed handwriting, inaccurate spelling, clumsy sentence construction or lack of punctuation (Newcomer & Barenbaum, 1991),
- brevity or little apparent effort, such as few words or little attention to detail (Graham, 1990), and/or
- unsatisfactory translation of ideas or “higher order” skills, e.g., irrelevant content, disorganised paragraphing and text structures, fragmented or no plot development, and few characters, thoughts, feelings, settings and consequences (Montague, Maddux & Dereshiwsky, 1990; Hedberg & Fink, 1996; Zipprich, 1995; Thomas, Englert & Gregg, 1987; Wong, 1998; Gleason, 1995).

Tutors need to assess both translation and transcription deficits, and identify academic factors which could contribute to an apparent lack of effort. A problem in transcription may contribute to difficulties in higher order skills. Students will alter the writing task to reduce excessive task constraints. Their coping mechanisms could include tactics such as writing slowly, making simple word choices (restricting vocabulary) or disregarding spelling. Lack of effort or productivity in written compositions may be linked to excessive task demands, as shown by Tetroe (1984, cited in Bereiter & Scardamalia, 1987).

Problems in basic skills demand effort which otherwise could be allocated to higher order aspects of writing. A trade-off may occur between effort allocated to transcription and the effort needed for translation, according to Graham (1990). He compared dictated and hand-written essays by students with learning difficulties. The

students produced less when they wrote, rather than dictated essays, even when fluency rates were equivalent (e.g., 6.5 seconds per word in Grade 6 students when dictating slowly and when handwriting). This was attributed to the extra effort needed for transcription when handwriting, spelling and punctuation skills were poor, which consumed some of the effort needed for productivity.

Effort is also needed for rapid translation. In Graham's (1990) study, students dictated shorter essays at normal speed compared to essays dictated slowly. The dictated story condition required the translation of ideas into speech only. The faster translation rate seemed to demand more effort, limiting sustained productivity. Faster translation rates also corresponded to better composition quality. Students wrote essays containing an average of 8.2 text units (premises, reasons, conclusions and elaboration), slowly dictated essays with 12.3 text units, and produced 14 text units in essays dictated at normal speed. Quality was best during normal dictation (with the fastest rate of production, at about 2 seconds per word) and worst for the hand-written condition.

These results suggest that writing quantity and quality could improve with gains in fluent (effortless) transcription *and fast (effortful) translation*, together constituting a fluent rate of story production. This is consistent with research by Berninger and Stage1 (1996) reporting that fluency gains - in writing sentences and stories - were linked to improved writing quality in primary school students. The studies help to identify a mixture of components needed for skilled writing. Accurate knowledge, alone, is unlikely to diminish the effort needed for transcription. There is little evidence that handwriting or spelling improvements lead to gains in higher order writing skills, particularly in students over 10 years of age (Newcomer & Barenbaum, 1991). Reynolds, Hill, Swassing and Ward (1988) taught 54 high school students revision strategies, improving basic skills but not affecting the quality of writing.

Fluent transcription demands both speed and accuracy. Less effort is needed to write, leading to an increase in the quantity of words written (Graham, 1990). To improve the quality of written compositions, however, this effort may have to be

re-directed into translation skills. Plotting and writing words and ideas, under time constraints, requires the efficient integration of knowledge, task, transcription and translation skills. It is this dimension of writing which Swanson and Berninger (1996) link to working memory capacity, and which is considered unable to be automatized.

Generally, teaching strategies develop translation skills by providing students with appropriate knowledge in content areas, vocabulary, discourse procedures and grammar. The aim is to increase the number of relevant writing ideas. Learning difficulties may lead to gaps in knowledge which could cause various problems. For example, a limited vocabulary may distort intended meanings (Wong, 1998), while a good vocabulary could reduce the effort involved in writing, despite working memory problems. Swanson and Berninger (1996) observed that vocabulary mediated the association between working memory and overall writing skill. A few, well-chosen words may convey a wealth of meaning, helping to minimize the effects of limited productivity.

Improved discourse knowledge is associated with higher order written expression skills. Graham, Schwartz and MacArthur (1993) surveyed students in Grades 4 to 8, and found that students with LD equated quality of writing with basic skills, such as spelling, and showed little understanding of genre structure. The students without learning disabilities were more likely to say that structure and content were important, and demonstrated a better understanding about how to plan compositions. This was consistent with later research by Benton, Sharp, Corkill, Downey and Khramtsova (1995). They analysed written compositions on specific topics, finding that poor discourse knowledge was linked to limited higher order writing skills (thematic maturity) in a sample of 99 ninth-graders of average ability.

It seems likely that vocabulary and discourse knowledge could assist in developing written expression skills. This does not explain how students with ADHD overcome learning difficulties to gain the relevant knowledge, or how they overcome storage limitations in order to apply this knowledge when they are writing. Existing remedial teaching strategies suggest ways to improve relevant skills, knowledge and access to known information. Several teaching approaches will now be reviewed.

Remedial Teaching Strategies

There are various teaching methods aimed at overcoming writing difficulties experienced by students with LD. These methods will be described in turn, and then the more general teaching strategies for students with ADHD/LD will be reviewed.

Strategies for Written Expression Difficulties

Practice

The mechanical aspects of writing may be practised to the point of automaticity. Some teachers advocate daily practice to improve writing fluency (e.g., Outhred, 1989, cited in Newcomer & Barenbaum, 1991, p. 580). The rationale is that if the basic skills require less attention, the writer is free to attend to higher order writing skills. However, practice alone will not improve writing in students with learning difficulties.

Sawyer, Graham and Harris (1992) taught written expression to 10 year-olds with learning disabilities. They placed 33 students into four groups and each group was taught using a specific method. One group used practice alone, without further instruction. This was not successful in improving *any* measure of written expression in students with writing difficulties. Benefits occurred *only* when practice was combined with structured teaching strategies to address skill and knowledge deficits.

Story Grammar

If students with LD have writing difficulties because they do not know enough about discourse, this could be solved by learning the relevant facts from a story grammar. Specific genre headings may be taught to help students plan the story before writing it. This has been shown to improve structure in compositions (Montague, Maddux, & Dereshiwsky, 1990; Thomas, Englert & Gregg, 1987). Martin and Manno (1995) taught students to plan and write using story grammar, a written framework listing salient points about the narrative genre. Story elements

presented in a linear format, in “think-sheets” (as shown in Figure 5) to cue retrieval and self-evaluation. Students wrote more story elements in compositions, but story length did not increase.

		STORYELEMENT DEFINITION	
	Write as I plan:	Check as I write:	
MAIN CHARACTERS			Main character can be a human, an animal or a fantasy character
OTHER CHARACTERS			Other characters people or animals (or fantasy characters) that the main character interacts with or talks about
SETTING			Setting a place where the story occurs or a place and a time for the story
PROBLEM			Problem a situation encountered or desired by the main character, the premise for the story
PLAN (ACTION)			Plan an attempt on the part of the main character to solve or address the problem
ENDING			Ending a resolution to the problem

Figure 5. Story planner think-sheet (linear format) (Martin & Manno, 1995, p. 144)

The use of more story elements does not necessarily result in longer stories or improved fluency. Writing difficulties may be caused by more than a lack of discourse knowledge. A student’s writing problems may relate to limitations affecting rapid retrieval of known information. Teachers may offer extra time to write and ongoing, visible retrieval cues. Alternatively, story grammar cues may be memorized so that they need not rely on the teacher to provide task materials such as “think-sheets”. They can then reproduce the cues independently.

Students’ writing problems may continue, due to storage limitations. They must be able to apply the story grammar, a higher order skill. Cues could be memorized in a form which minimizes the storage required in working memory. Increased story length has been associated with remedial teaching strategies that incorporate factors such as instruction, guided practice and fluent recall of

story grammar (Sawyer, Graham & Harris, 1992; Zipprich, 1995; Wong, 1997; Wong, 1998; Montague & Leavell, 1994). Montague and Leavell (1994) taught 13 students with writing difficulties to memorize story grammar and use the knowledge in story-writing. Ten students increased numbers of words and propositions per story.

Spatial Outlines

One form of story grammar is the story map. This is a spatial version of the “think-sheet”. This format is recommended for primary school students (First Steps, 1994). An example is provided in Figure 6.

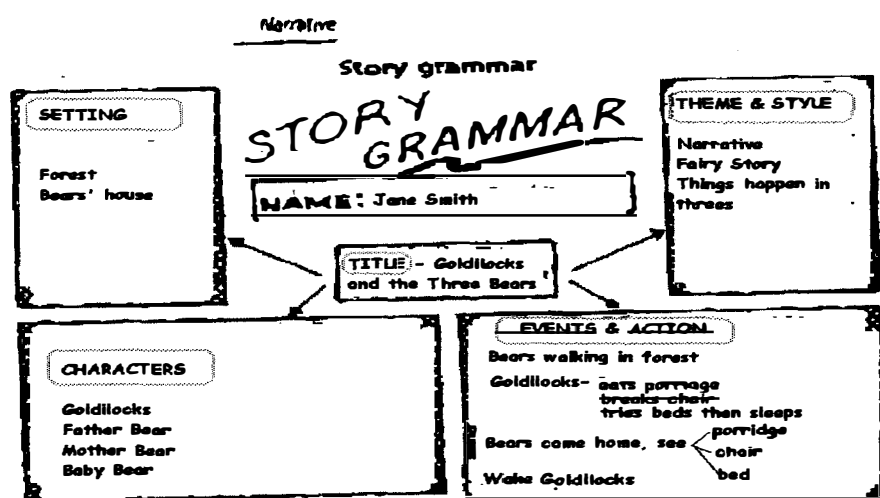


Figure 6. Story grammar - spatial format (First Steps, 1994, p. 30)

There are potential advantages in using spatial outlines as a teaching tool, including: minimizing the effort necessary to encode and retrieve information, increasing speed of memorization of content, and increasing speed in understanding relationships between ideas. Benefits have been shown in short-term recall and essay writing (Robinson, Katayama & Fan, 1996; Robinson & Kiewra, 1995; Robinson & Schraw, 1994).

Students with learning disabilities have used spatial outlines to improve reading comprehension (Wong, 1996), a higher order skill associated with written expression (Swanson & Berninger, 1996). The spatial format may assist students with writing difficulties, by providing immediate access to genre knowledge and associations

between ideas. A limited amount of empirical research suggests that spatial outlines are useful planning tools for students with writing difficulties. Sinatra (1986, cited by Gleason, 1995) found that pre-structured spatial planners improved writing without the need for extended instruction. Students with learning disabilities were asked to write one story and two essays using ideas presented in list form, and these were compared with equivalent compositions based on ideas from spatial outlines. The research lasted 6 weeks and found positive effects for network designs, compared to lists. Zipprich (1995) used a story grammar think-sheet in a spatial format to teach 13 students aged between 9 and 11 years to plan better stories. All had writing difficulties. Individual results varied, but may have been affected by negative group influences and uncontrolled variations in topic interest. Ten students improved the length of written stories, and all students improved on a holistic “quality” score based on story elements.

Unstructured Spatial Outlines

Plans using spatial formats need not be pre-structured. It is a common practice for classroom teachers to involve students in “brainstorming” or “clustering” words on the blackboard, a technique used in a range of different subject areas. Yet there is little empirical research showing the results of students using unstructured spatial outlines in remedial writing programs.

Hallenbeck (1996) taught high school students with learning difficulties to generate their own webs. Students brainstormed ideas into a web plan, revised it using focus questions drawn from discourse knowledge, and then organised the web ideas using colour coding. This was followed by other strategies to finish planning, drafting and revising. Group results were reported, showing that students’ writing improved after a 6 month period of instruction. Although the web was only one aspect of a broader teaching program, Hallenbeck’s research is useful because it documents the successful implementation of a secondary school remedial writing program which included self-generated webs.

Strategy Training

Hallenbeck's webs were part of an approach called "Cognitive Strategy in Writing (CSIW)" (Englert, 1990b, cited in Hallenbeck, 1996). Cognitive strategies teach students about writing procedures. Students are told how to write, but not what to write. These strategies are not genre-specific, although they may include genre frameworks.

A simple example is the **PW2R** strategy, which requires students to spend 5 minutes **P**lanning, 5 minutes **W**riting, and 5 minutes **R**eviewing and **R**evising. Berninger, Abbott, Whitaker, Sylvester and Nolen (1995) taught handwriting, spelling and the PW2R method to Grade 3 students with writing difficulties over a summer holiday period. Guided and independent practice opportunities were provided and feedback was given to students. The teaching method required "successive approximations" towards achievement goals. The teacher corrected the most basic and fundamental flaws first and feedback became more specific in response to students' learning. Students improved fluency, story length and quality, compared to a group which had not had instruction at all. While this does not seem surprising, the gains in story length and quality were maintained 6 months later, long after all participants had returned to regular classwork.

More complex strategies use procedural cues and mastery criteria for genre frameworks. An example applicable to narratives is Englert's **POWER** mnemonic: **P**lan, **O**rganise, **W**rite, **E**dit and **R**evise/**R**ewrite (Englert, 1990b, cited in Hallenbeck, 1996). Thomas (1993, cited in Wong, 1996) used this strategy to assist upper primary-school students with learning disabilities to improve the quality and quantity of their writing. Students may be supplied with "think-sheets" or asked to memorize a mnemonic reminding them of writing subtask procedures.

Self-regulation

Self-regulation refers to "skills an individual might utilize to monitor her or his performance on a task: examples include self instruction, goal setting, self-assessment, self-recording and self-reinforcement" (Case, Mamlin, Harris & Graham,

1995, p. 22). Students monitor, revise and evaluate their own writing, using devices such as graphs or check-off systems. Results from self-regulatory approaches have not been consistent. Effective interventions have included instruction in genre and planning, and have not been limited to strategies for revision.

Sawyer, Graham and Harris (1992) found that self-regulation improved numbers of story elements and generalisation, but the best gains were reported from conditions which modelled genre elements (with story parts reminder), a writing procedure and collaborative practice, with or without self-regulation. Self-regulation required students to set goals and graph results. The writing procedure (SRSD) included these five steps: “(a) look at the picture, (b) let your mind be free, (c) write down the story part reminder, that is “WWW (who, when, where), What = 2, How = 2”, (d) write down story-part ideas for each part, and (e) write your story; use good parts and make sense”. The story parts reminder represented the following questions: **“Who** is the main character? **Who** else is in the story? **When** does the story take place? **Where** does the story take place? **What** does the main character want to do? **What** happens when he or she tries to do it? **How** does the story end? **How** does the main character feel?” (p. 340). The various strategies had no significant effects on the overall quality of written expression. Only 6 teaching hours were allotted, which suggests that improved writing quality requires a longer period of instruction.

In a later study, Graham, Schwartz and MacArthur (1995) found that the simple instruction to “add information” was more effective than detailed revision sheets. There was no significant increase in composition length associated with instruction conditions, although improved quality was noted for the group using the simpler prompt to revise.

Interactive Dialogues

Structured group activities include interactive dialogues and “writing community” approaches, or a single “buddy/editor” approach (Hallenbeck, 1996). Talking to peers about the writing product helps students to recognise that the purpose of writing is communication and that the paper is written for a reader.

ADHD is commonly associated with poor social skills, problems in re-telling stories and difficulties in listening effectively. Group discussion demands verbal responsiveness and good listening skills. Students with ADHD and learning difficulties may find it difficult to tell others their own story ideas in an organised, coherent way. They may find it difficult to wait their turn and may forget salient story ideas which are repeated or embedded in detail. These problems could prevent early gains in writing skills, although difficulties would vary between individual students and would be affected by the way the groupwork was structured.

Combined Approaches

Many researchers use a combination of approaches. For example, Wong, Butler, Ficzer and Kuperis (1996) used plan sheets, word processors, peer collaboration, student/teacher dialogues, cued phrases and prompt cards in the one intervention. Essays increased in clarity and cogency of argument. However, teachers are left to guess which strategy might be more effective for students with specific difficulties. Research on one or two variables, isolated from other interventions, may help to illustrate the potential effects of one or two strategies. Fewer interventions do not necessarily mean less improvement.

Strategies for Students With ADHD

Some of the above strategies may not be effective for teaching students who have both ADHD and learning difficulties. These students may not respond as expected. For example, self-regulation is one aspect of executive control (refer to Appendix B), and is a deficit associated with ADHD symptoms (Tannock 1998). Abikoff (1991) reviewed the literature on metacognitive strategies for self-regulation in students with ADHD. These methods were found ineffective in improving behaviour or academic performance for ADHD students. When gains were made, other specific teaching practices helped students to learn to apply skills in the particular context, rather than improving metacognitive skills (such as general ability

to pay attention), and gains were not generalised to a range of untrained tasks and settings. Wong (1996) questioned the value of executive routines (e.g. self-talk, self-monitoring) when students with ADHD are deficient in the abilities needed to execute such routines. As noted earlier, executive control may improve as students become fluent or familiar with the task. However, self-regulation training may not be the most effective way to begin a remedial written expression program for students with ADHD/LD.

Du Paul & Eckert (1998, p. 78) advised that “students with ADHD have divergent needs and typically exhibit idiosyncratic responses to interventions”. Researchers have commented upon the difficulties of implementing LD writing programs with students who have attention and behavioural disorders. Martin and Manno (1995) observed that one student, Rudy, responded differently from the other students participating in a writing program for children with learning difficulties. Rudy had a behaviour disorder and LD, and his data showed variable performance. He “could have maintained” a satisfactory level of written expression performance but he was “distracted” (p. 147). The authors considered that one answer to Rudy’s difficulties could be to modify the writing environment.

Another single subject study reported problems with inattentive children. Zipprich (1995) notes that “for Beth, especially, and Max, to a degree, inability to attend made it virtually impossible to get an adequate sample of their writing. This resulted in frustration and disinterest for Beth, who later quit the study” (p. 31). The reports about Max are consistent with Martin and Manno’s (1995) comments about Rudy. It was considered that “a self-management strategy and more personalized instruction may have helped Max stay on task”, as Max “made impulsive and irrelevant responses” and was unable to gain group acceptance which “coupled with concentration problems adversely affected his performance” (p. 31). Their data showed that Max did improve his writing scores, although the academic gains may have been overshadowed by the difficulties in obtaining them. Objective, quantitative measures of writing skills help to distinguish behavioural problems from academic progress. Visible progress encourages both students and teachers alike.

More systematic approaches are needed to research these difficulties. Prior consideration of ADHD/LD characteristics and learning needs, combined with functional analysis, could help to assess the problem, generate alternatives and monitor implementation. In evaluating graphed ADHD/LD performance, it may be useful to consider peaks and troughs as a gap between optimal and impeded performance. Task performance may fluctuate in response to changes in arousal, motivation, or inhibition (self-control and effort) (Oosterlan, Logan & Sergeant, 1998). These factors can be altered by fatigue, onset times of medication, interest and knowledge specific to the topic, affect, extrinsic distractions and competing task demands (Barkley, 1997b). Teaching programs may address some of these factors.

Specific task materials may affect writing performance by students with ADHD. O'Neill and Douglas (1981) were surprised to find that students with ADHD/below-average reading skills obtained scores equivalent to controls in a narrative recall task. Students with RD-alone did not perform as well as controls. It was observed that the students with ADHD may have benefited from the type of lesson materials used by the researchers. The stories were interesting and predictably structured, and were presented both aurally and visually. Also, students were permitted to choose their own study strategy to review the material. The group with ADHD tended to revise text by skimming - a low-effort option which minimized repetition. However, variations in task conditions were not controlled and tested, and the influence of different task design factors on the narrative writing of students with ADHD has not been researched.

One study which was relevant to higher order language skills showed that embedded detail and repetition were found to reduce aural comprehension in students with ADHD. Shroyer and Zentall (1986) investigated the effects of task constraints on listening and comprehension in children from 7 to 10 years of age. They changed the way an audiotaped story was presented to the students, varying the amount of repetition, detail and pace. When adjectives doubled the story length, students with ADHD recalled significantly less on a written comprehension test compared to a

control group of students without ADHD. Poorer recall, increased motor activity and off-task behaviour were found in students with ADHD when the story was repeated.

Certain types of instruction are effective for students with ADHD and learning difficulties, although research has not investigated the effects of varying methods for teaching written expression. Barkley's model (1997b) of ADHD implies that teachers should present tasks by: (a) facilitating immediate responses, reducing the need for "think time", (b) reducing effort, frustration and the load on working memory, and (c) building structured thinking routines in students. This is consistent with research cited by Gardill, DuPaul and Kyle (1996) showing that students with ADHD improved behaviour and/or academic achievement with *one-to-one instruction and increased supervision* (Pfiffner & Barkley, 1990), *structured peer tutoring* (Du Paul, Bankert, Ervin & Keyle, 1995; DuPaul & Henningson, 1993), *eye contact and teacher proximity* (George, 1986; Martens & Kelly, 1993), and *frequent opportunities for active task responses* (Pfiffner & Barkley, 1990; George, 1986; Martens & Kelly, 1993; Zentall & Meyer, 1987). Tutors often use the same instruction techniques to improve academic skills in students with learning difficulties.

Infrequent and delayed feedback have been found to worsen academic performance (Pfiffner & Barkley, 1990, cited in Gardill, DuPaul & Kyle, 1996). This type of delayed feedback is common in classrooms due to syllabus demands and class sizes. Immediate feedback may be provided in a classroom through the use of peer-, computer- or self-marking, or by enlisting the assistance of teacher aides or parent volunteers. Tutoring strategies can incorporate instruction and assessment into corrective feedback, by planning to correct specific types of errors and prompting students to recall correct responses later.

Students with ADHD and learning difficulties are likely to be most alert and receptive to new information at the start of a lesson, or the beginning of a task, suggesting that a remedial written expression program could begin by focusing on teaching the planning subtask. Successful learning at the earliest possible stage is critical for students with minimal tolerance for delay, aversion to repetition, and low frustration thresholds (characteristics of ADHD).

It is difficult to teach a complex, sustained task such as composition to active and impulsive students. Inattention may also limit productivity. A simple approach requiring only brief bursts of concentration could minimize effort and reduce complex task demands on working memory. Higher order writing skills may respond to an approach which prompts immediate recall and facilitates the storage of information in working memory while writing.

Thesis Interventions

ADHD and learning difficulties are associated with limitations in working memory capacity which may disrupt the juggling of writing task constraints. Story-writing will improve if task design and instruction can simplify the writing task and impose few demands on working memory. In the present study, the PW2R approach is to be used across all phases. The story web and story grammar wheel will be applied in separate phases. Each of these strategies will now be described.

PW2R & Planning

The PW2R approach asks students to spend only 5 minutes planning, 5 minutes on drafting, and 5 minutes on reviewing and revising. Establishment of a timed writing routine pre-empts the need for students to monitor movement between subtasks. This reduces the number of task demands. The short time periods help to minimize the amount of work within each component stage. Five minutes of continuous writing seems an attainable goal for students with ADHD and writing difficulties, from mid-primary through to mid-secondary grades. Using discrete stages also simplifies story-writing because it breaks the task into sections, reducing the number of simultaneous demands during each part of the writing process. The PW2R teaching strategy includes immediate feedback, collaborative and independent practice, graduated prompts, successive approximations and one-to-one supervision.

Of all the subtasks, planning places the least demands on transcription skills (such as handwriting, spelling and syntax). If a trade-off occurs between mechanical and higher order skills, the planning stage would be an appropriate place to free effort for higher-order writing skills. Flower and Hayes (1980, pp. 43) claim that planning is “highly teachable”, but focus on complex planning strategies for skilled writers. In contrast, the PW2R strategy asks students to plan simply by talking aloud. Other forms of planning may be substituted for oral planning during the PW2R procedure.

Two alternative planning techniques are self-generated “webs” or teacher-generated story grammars. Written planning methods have the advantage of providing a permanent record which can be used to show students how to plan a composition, and then how to convert the plan to the draft story. This second step must be taught as students cannot be assumed to know how to use the plan to assist them in writing compositions. Planning is only effective to the extent that it helps students improve the quantity and/or quality of the subsequent composition.

Story Web

One form of plan is a “story web”. This is a diagram which organises ideas on a topic before sentences and paragraphs are written. Conventional sentences and paragraphs are in “linear form,” starting with a topic sentence or heading and proceeding in vertical steps from the main idea to the conclusion. The web diagram is in spatial form “starting with a main idea in the centre of a piece of paper then branching off from the main idea into categories of information” (Zipprich, 1995, p. 4). A web format may prompt students to generate relevant ideas and free resources to store these ideas while students write. This relates to how diagrams are remembered.

The spatial format provides a second avenue for storage in working memory (WM). Diagrams are stored in the visuospatial sketchpad. Words are stored in the phonological loop. When words are written in linear prose and also in diagrams, the use of both storage domains can provide short-term advantages for encoding and

retrieving additional data (Robinson, Katayama & Fan, 1996). The visuospatial sketchpad is a separate system which does not share resources with the loop (Gathercole, 1998). Interference between the systems is minimal from the age of ten years. From that age, phonologically-based processing tasks, such as retrieval and manipulation of words and sentences, will not erode storage of a diagram in the sketchpad. This protects ideas stored in the web during the writing process.

Dual encoding theory suggests that the items in the sketchpad can supplement stored words (Matlin, 1994; Mousavi, Low & Sweller, 1995), and that the use of both words and pictures may increase the amount of information which can be stored and readily accessed in working memory while simultaneously performing other tasks. A common example of this is television's use of words and pictures, increasing the immediate impact of the message. The use of both domains offers a potential way to maximise limited capacity for children over the age of 10 years.

Students could use a spatial format to plan written compositions, as advised in First Steps (1994). There may be a number of advantages in using diagrams to plan writing. For example, they may help students with learning difficulties to organise their ideas into a framework. Spatial outlines with text improved undergraduates' essays, according to Robinson and Kiewra (1995). In that study, one group of students used diagrams and text to study new material, and another group used text alone. In the short-term, the diagrams-plus-text group wrote more "complete and well-organised essays" than the students who had used only text, an advantage attributed to the storage of a "more complete and better-organised internal representation in memory" (p. 465) through the visuospatial sketchpad.

Diagrams may help students to make associations between ideas when they plan and then remember these links when they write sentences. A network of ideas may be developed from a web plan by using techniques such as brainstorming and clustering, to promote the rapid assembly of information. Brainstorming uses free association, which is the random generation of one "like" idea after another in a "rapid and effortless" manner (Schneider & Pressley, 1989, p. 53).

The spatial format will reduce the effort needed to generate ideas as visuospatial encoding occurs economically, quickly and with little effort or elaboration (Robinson & Schraw, 1994). The recording of ideas in a written diagram may also help students to generate sets of “like” ideas. It allows the writer to glance back over all of the words related to the topic after each chain of associated ideas is exhausted. This enables exploration of various trains of thought without forgetting the original topic.

Story Grammar Wheel

Story grammar may be presented to students as a wheel-shaped diagram which stipulates the story elements needed to formulate a plot. Students are able to reproduce the diagram, with story elements, and use this as a basis to plan a story. The story title is written in the centre of the page. Story elements branch outwards from the title in the centre to the rim of the wheel. Students write their own ideas next to each story element, but outside the rim.

“Lack of interconnectedness” between ideas is a common problem in the writing of students with LD (Thomas, Englert & Gregg, 1987). Spatial outlines may be an effective way to remember associations between ideas in the short-term. Robinson and Schraw (1994) asked 48 undergraduates to learn information presented as text-only, text then spatial outline, and text then linear outline. The students using the spatial outline were better able to compare, categorize and find relationships between ideas. These students averaged 86% for “patterns” compared to text-only students who averaged 63%. The spatial outlines helped students to relate essay ideas together, a skill similar to linking story elements into a coherent plot.

The story grammar wheel organises the sequence of ideas so that the students need not re-arrange the ideas when they write their draft. They can work around the wheel diagram in a clockwise direction, taking each idea from the plan and writing its corresponding sentence. The plot ideas could be generated in any order, but would be slotted into place when recorded in writing in the plan. The plan sequence reduces

the likelihood that ideas will be confused, omitted, repeated or fragmented into a random series of events at the sentence drafting stage.

Memorization of story elements enables students to use the strategy independently of lesson materials or “think-sheets” provided by the teacher. This goal is assisted by re-naming story elements, using simple, familiar terms which are easy to remember. For example, the term “setting” can be changed to “time and place”.

The wheel shape may help students to remember story elements, as short-term recall of words has been shown to improve when using visual organisation strategies (Baddeley, 1997). The effort involved in recall of terminology, no matter how simple, means that the strategy would be unlikely to be maintained by students unless they were given specific instructions to use it.

Transfer to other settings could occur if students were trained across settings and if they were fluent in recall. Transfer of the diagram to other genres would depend on whether students possessed relevant discourse knowledge applicable to those other genres, and whether they could incorporate that information into a wheel diagram without specific training showing them how to do this.

Oral plans contain none of the advantages outlined for web or wheel planning strategies, seem unlikely to reduce demands on working memory and may not immediately improve productivity or story quality in students with ADHD and learning difficulties. Teaching is likely to be more effective when using written planning strategies and spatial formats, rather than oral planning. This thesis will study the different effects of written and oral planning strategies on students with ADHD and writing difficulties.

Performance Measures

Students could learn the three planning methods, as outlined above, to improve story-writing skills. Objective measures of improvement are needed. Writing difficulties typically affect the length and quality of compositions. Length of

compositions can be measured by counting the number of words in stories. This is considered a valid measure of general writing proficiency (Tindal & Marston, 1986).

The number of words may not reflect whether additional information is stored and accessible when writing stories based on web or wheel plans, as each word does not represent one “chunk” in working memory. Ideas are thought to be encoded and retrieved as propositions (Anderson, 1995). The number of propositions in written stories may suggest the number of task-related ideas which can be stored while writing.

Propositions may also provide information about translation skills. McCutchen (1986, p. 436) suggested that “propositions would be useful in an analysis of idea generation during writing”. The generation of ideas is a higher order skill, whereas number of words should help to show fluency in transcription and translation skills. The number of propositions written under time constraints may help to indicate the rate of idea generation in translation. When researching writing difficulties, Zipprich (1995) counted words and propositions, as did Montague and Leavell (1994).

The quality of narratives may be measured by rating relevance and story elements. Relevance has been identified as a common writing difficulty reflecting lack of “higher order skills”, so this variable should be included in assessing planning strategy effects on translation skills. Relevance involves understanding the topic and making logical links between sentences and the topic - the “rhetorical problem” constraint in the Flower and Hayes (1980) model of the writing process.

Writers sift through ideas, selecting content and structure by using genre conventions. This shows skill in applying appropriate discourse knowledge, communicating effectively and meeting reader expectations. The narrative genre contains a number of story elements, regarded as key factors in writing quality (Martin & Manno, 1995). Story structure is commonly measured by the number of story elements in students’ narratives. Number of story elements would help to assess the effects of planning strategies on the higher order skills needed in written expression.

The Present Study

This thesis will investigate how planning strategies affect story-writing skills in five individual students. Students will be taught to write stories under time constraints using the PW2R approach of 5 minutes to plan, 5 to draft and 5 to review. These stages will be held constant across phases. In addition, instruction will be individualised, utilise graduated prompts and specific, positive feedback, and facilitate accurate, guided and independent practice.

Planning methods will be varied across phases. In baseline, students will orally plan stories. In the first intervention phase, students will plan by writing story ideas into a web diagram. The only prescribed part of the web plan is the story topic, which must be circled in the centre of the page for them. In the second intervention phase, students will learn to plan by using 6 teacher-prescribed headings denoting story elements. These are to be memorized and written into a “wheel” shaped diagram. Students will add their own ideas on story content. Finally, a maintenance phase will test whether students will remember how to write stories using these strategies without lessons to remind them of procedures or story elements.

Changes to the planning subtask are expected to lead to improved writing outcomes from the start of the intervention phases. The web should reduce task demands and increase working memory resources, compared to oral planning. More effort would be available for translation skills. Stories should become longer and more relevant to the topic. The wheel strategy adds prescribed story grammar to the task. This is unlikely to raise productivity beyond web levels as more effort will be needed to remember the story element terms. Students should write longer stories using the story grammar wheel than when orally planning stories, due to the working memory advantages associated with the written, spatial format. The story grammar wheel is expected to increase the number of story elements used by students to structure their written compositions.

Each story will be assessed for 4 dependent variables: number of words, number of propositions, number of story elements and relevance. Each individual will be treated as a separate case study, with gains and declines in performance compared across sessions within and between phases.

Differences between phases will show whether one planning method yields better results for specific variables, and will also show the onset and duration of gains when teaching students to plan using that method. Maintenance of gains will be tested for one written planning strategy and compared to the baseline strategy.

Hypothesis One

When students use a self-generated web strategy, they will:

- (a) write stories which contain more ideas and words and contain a higher proportion of relevant words, compared to when they use a strategy which utilizes only oral planning, and
- (b) maintain and transfer this strategy, as it is broadly useful and imposes low demands on working memory.

Hypothesis Two

Using the Story Grammar Wheel, students will:

- (a) write more words and ideas than under baseline conditions and replicated baseline conditions, but not compared to self-generated web conditions,
- (b) write stories which contain more conventional plot and characterisation elements than in the web strategy or baseline, and
- (c) write stories which contain proportionately more relevant words than in the web strategy or baseline.

CHAPTER THREE

METHOD

This research used a single subject design with students participating in a 20-week remedial writing program, based on one 45-minute session per week. Every session was conducted on a one-to-one basis and included a 15-minute test.

Participants

The participants were five boys between the ages of 10 and 15 years. Their written expression skills were weak compared to their ability in other academic areas and/or compared to same-age peers. The students had been medically diagnosed with ADHD, and medication routines had been stable for 6 months prior to commencing this research. All had reports of behavioural and learning difficulties, e.g., mild aggression, failure to finish school-work. All had a history of hand-writing problems commencing in junior primary school. Handwriting or spelling difficulties continued to trouble them, although they had reached the point of being able to write legibly. All students generally produced short compositions of a poor quality.

The term “learning difficulty” is used here to describe students with written expression problems, evidenced by standardized tests, and school and psychologists’ reports. Researchers indicate that writing difficulties are reflected in poor or below average scores on standard writing tests. Graham, Schwartz and MacArthur (1993) assessed students as having “writing difficulties” if they obtained a Thematic Maturity (TOWL, 1988) score of 7 or less, representing one or more standard deviations (3 points) below the mean (10)

In this thesis, all five participants demonstrated “below average” or “poor” scores in the Test Of Written Language (TOWL) Spontaneous Writing Quotient and/or the Thematic Maturity standard scores (Hammill & Larsen, 1995). As can be

seen in Table 2, students' Thematic Maturity scores varied from 5 to 7 points for three students. Fred and Otto obtained a Thematic Maturity score exceeding 7, but they had skill deficits in related areas. Fred scored 7 or less for four other TOWL subtests - including a 6 for vocabulary. Otto obtained scores of 7 or less in five subtests, with a score of 3 for syntactic maturity (vocabulary used in story-writing).

Participants met at least two of the following criteria:

- A gap of 2.5 years between chronological and spelling/reading age;
- A Thematic Maturity subtest score at least 1.5 standard deviations (4.5 points) below other TOWL subtests,
- A TOWL spontaneous writing quotient which was 1 standard deviation (15 points) below the contrived quotient, and/or
- An obvious discrepancy between assessed story-writing skills and other skills or general ability (e.g., average IQ and poor Thematic Maturity).

Table 2
Individual TOWL Subtest Profiles, March.

	SEBASTIAN	FRED	PHILBERT	THEODORE	OTTO
<u>Contrived Knowledge</u>					
Vocabulary	10	6	16	9	8
Spelling	8	7	12	10	9
Punctuation	8	7	7	8	6
Logical Sentences	9	10	10	10	9
Sentence Combining (syntax)	10	10	18	6	14
Total Contrived					
Quotient Rating	<u>average</u>	<u>below average</u>	<u>superior</u>	<u>average</u>	<u>average</u>
<u>Story-Writing Skills</u>					
Thematic Maturity	5	9	7	6	9
Semantic Maturity (applied vocabulary)	6	8	11	9	3
Syntactical Maturity (applied syntax)	8	10	9	6	6
Spelling	8	9	10	7	5
Style (Punctuation)	7	6	7	7	7
Total Spontaneous Writing					
Quotient Rating	<u>poor</u>	<u>below average</u>	<u>average</u>	<u>poor</u>	<u>poor</u>

Sebastian

Sebastian was in Year 5 and was diagnosed with ADHD at the end of Year 4. He was a bright and articulate child, but the school reported learning and behaviour problems. He was the youngest of the participants. Psychologists reported “above average” IQ, but below average auditory memory, verbal and abstract reasoning, and poor reading and spelling skills. Academic tests showed specific difficulties with writing fluency and extended passage reading comprehension tasks. He took over an hour to complete 25% of questions on a TORCH (Mossenson & Hill, 1987) reading comprehension passage. His performance on reading age tests had improved dramatically within 4 months of commencing medication, but he was not a fluent reader and was reluctant to read for leisure/homework purposes.

Fred

Fred was in Year 7. He was a quiet, friendly child who was very interested in sport. He would say nothing rather than risk a mistake, and often used only non-verbal signals (nods, grimaces, smiles) to communicate opinions. He was diagnosed with ADHD at the end of Year 4. IQ was assessed as “average” by a clinical psychologist. During Years 5 and 6, a number of educational placement strategies were tried by parents. Fred attended remedial reading and writing clinics, including enrichment classes at school, and medication was also trialled. School reports in Years 5 and 6 showed substantial academic improvements, but still noted that story writing was “brief”. When assessed at the start of Year 7, word attack skills, reading fluency and spelling skills were over 2 years behind his chronological age, although sentence reading comprehension was average.

Philbert

Philbert was in Year 7 and was diagnosed with ADHD in Year 2 after reports of behavioural difficulties in the classroom. He was delayed in learning to read and write, and junior primary school-teachers reported that he was unable to remain seated during lessons. A clinical psychologist reported IQ as “very superior” but auditory memory (digit span) was found to be significantly lower (average). ADHD symptoms were controlled by medication from Year 2 onwards. At the school’s recommendation, he attended remedial classes until the end of Year 4. His reading age, reading comprehension and maths were reported as above average from Year 4. At the time of this research, Philbert’s spelling was assessed as commensurate with age. His handwriting improved at onset of medication but he still wrote very slowly and legibility was poor. He could not finish classroom tasks which demanded copying extended passages within time constraints. Written composition skills were below average, a level which was inconsistent with reading skills and vocabulary.

Theodore

Theodore was in Year 8. He had been diagnosed with ADHD in Year 4. His mental arithmetic skills (speed/accuracy) were advanced for his age, yet he had problems with spatial math and problem-solving. Medication commenced in Year 5, and remedial teaching assistance was provided in Year 7 for reading and spelling. Reading fluency was slow to develop, and Theodore was a reluctant reader. By the start of Year 8, he had developed average skills in reading, reading comprehension and spelling, but he still found writing difficult. He had difficulties with written syntax. Theodore’s handwriting improved from the onset of medication until its effects waned five hours later. Without medication, letters could become very large and uneven. He had developed a firm routine of writing very slowly, taking much care to ensure lettering was as neat as possible. He said he had difficulty finding

ideas to write about and jumbled the order of words and sentences. He often voiced worries about being asked to re-write anything, and preferred to write one neat draft - not one rough draft and a neat copy. He clearly found writing stressful.

Otto

Otto was in Year 10. He had an early history of hyperactivity and impulsive behaviour, including risk-taking. ADHD symptoms were managed by medication from Years 4 to 9. Otto was sent to a specialist centre for students with ADHD but enrolled in a regular high school in Year 8. In Year 9, Otto ceased taking medication to treat ADHD symptoms. His Year 9 English teacher commented that the boy seemed “lazy and disinterested”. At that time, his reading age was 6 years below his chronological age. This was at odds with his Peabody Picture Vocabulary test score assessed as 14;11 when he was aged 14;1. Otto enjoyed drawing and woodwork, showing talent in these areas, and the reading clinic teacher had built up a positive rapport with him. However, he continued to be troubled by conflicts and failing grades at school during the period of this research.

Research Design

Phases

Students worked in a one-to-one setting with the teacher over Terms 2 and 3, at a rate of one session per week. As shown in Table 3, there were four phases: three learning phases which continued for 16 - 19 weeks, and a maintenance phase which continued for 3 - 4 weeks. Phase A (baseline) lasted three sessions for three students, four sessions for Fred and five sessions for Otto. Phase B, in which students were taught to write using a story web, was scheduled over six sessions. Phase C, which incorporated story grammar, spanned six or seven sessions. The extra time allowed

the story elements to be learned. Phase D tested maintenance of either the web or wheel technique over the 4-week period immediately following Phase C. Only Otto did not participate in Phase D.

Table 3
Number of weeks spent for each student during Phases A to D.

	Baseline	Web	Wheel	Modified Wheel	Learning	Mtce	Total Weeks
	A	B	C	C2	Weeks	D	
Sebastian	3	6	7		16	4	20
Fred	4	6	7		17	6	21
Philbert	3	6	7		16	6	22
Theodore	3	6	7	3	19	4	21
Otto	5	6	6		17	0	17

Single Subject

The research was a single subject design. The teaching procedures were held constant across all phases for each individual, with the only variation being the type of planning strategy used as the intervention in each phase. This enabled interventions to be compared by considering the differences between phases for each individual student. A maintenance phase enabled the differences between baseline and intervention to be repeated, so that the design could provide stronger support for causal inferences about the effects of spatial planning.

Independent Variable

The independent variable was the *planning strategy* used by the students to write their narratives. The strategies were learned in Phases A, B and C in lessons conducted before the test in each session. In Phase A, students spent 5 minutes thinking and talking about story ideas. While students did not generate external

cues to remind them of what they had said, the oral planning strategy freed them from worrying about handwriting and spelling while they were generating content.

In Phase B, students generated web plans. This allowed ideas to be recorded in an unstructured way which did not place demands on capacity but did provide external visual cues for students to use while drafting and revising their stories.

In Phase C, a teacher-structured story grammar was used to guide planning. The strategy required students to reproduce a wheel diagram, remember story elements and their sequence, and generate related ideas for each element. The diagram also provided external visual cues to use in drafting and revising stories.

Phase D alternated one of the written planning methods with the oral planning method used at baseline. This maintenance phase tested whether students would remember how to use stipulated strategies and whether gains associated with written plans during the learning phase would continue after lessons stopped.

Transfer Probes

Transfer was tested at the end of a phase, if time was available for an extra session. The students would use the planning strategy learned earlier in the phase, and wrote a story in a classroom setting, or a report in the one-to-one setting. The topic materials and conditions were the same as for test stories.

Alternating Treatments at Maintenance

In Phase D, two strategies were randomly alternated (refer to Appendix F). In 50% of sessions in this phase, students planned orally. In the other sessions, students used whichever of the written planning interventions had been more successful in the learning phase. Where there was little difference between a student's web or wheel stories by the middle of Phase B or C, the wheel strategy was preferred for use in the maintenance phase. This was because genre knowledge taught in Phase C could not

be reversed in Phase D, preventing exact duplication of the written strategy conditions which applied in Phase A and B. As no further lessons would occur after the end of Phase C, any knowledge gains would be held constant across sessions using the written and oral planning methods in Phase D.

Controlled Variables

Extraneous factors were held constant for each student. In each session, students spent the same amount of time writing, worked in the same setting, with the same tutor, teaching and testing procedures and task materials varied only in the planning strategy stipulated. The difficulty and interest of story topics was controlled, and an equal amount of instruction was given per week. Each session used the same types of prompts and feedback, and each phase contained equivalent amounts of homework practice completed in the same setting. No specific motivational techniques were used, although praise was included in feedback after all lessons.

Dependent variables

There were four dependent variables: (a) number of words, (b) number of propositions, (c) number of story elements, and (d) relevance. Syntax was not a dependent variable, but it was observed in Theodore's case to explain his responses to the interventions. This variable is described in this chapter under Scoring Procedures.

Number of words was defined as the length of the story in total number of words. Length included the story title, as this is included in the Thematic Maturity marking key (TOWL, 1995) and because some students varied the words used in the set topic to make their own title, showing how they interpreted the meaning of the topic. Number of words reflected the ability to write continuously on the same topic for 15 minutes.

The second dependent variable, number of propositions, indicated how many ideas were written in each story. Propositions are “simplified sentences” (Montague & Leavell, 1994, p. 27) - a noun/verb phrase, with additional ideas counted if students supplied an adverb or adjective to elaborate on the subject or object of the sentence. Examples are provided in Appendix C.

Relevance was the proportion of words directly related to the topic. It required a logical sequence of ideas developing the set topic into a narrative. Satisfactory relevance scores required students to understand the meaning of the words used in the topic, and to write appropriate story content.

Story elements were adapted from standard story grammar frameworks, e.g., First Steps (1994). Five categories contained twelve elements, as follows:

- *setting:*
time and place,
- *characterisation:*
hero and wants,
friends and enemies,
- *initiating event:*
problem & plan,
- *complication:*
action and events, and
- *resolution:*
results and ending.

Instruments and Materials

Story Topics

Topic interest and perceived difficulty may influence motivation in students with writing difficulties and ADHD. Steps were taken to help control interest levels

in set story topics. Prior to the main study, local school-teachers were contacted to request their assistance with a survey. The related correspondence is attached in Appendix D.

Eight schoolteachers agreed to survey their classes, and a total of 135 local seventh-graders participated. The teachers told their students that they may be asked to write about some of the topics, which may have contributed to obtaining genuine opinions. Students were supplied with lists of story topics, and ranked each topic according to difficulty. This resulted in 10% of story topics being excluded because they were most frequently rated “difficult to write about”. Story topics were also ranked according to interest levels. Level “4” represented topics which were most interesting, “2” and “3” represented topics which were neither particularly interesting nor uninteresting and “1” indicated that these topics were boring. Topics which were rated as “4” and “1” by a majority of students were excluded from the lesson, homework and test materials. This left a pool of 70 story topics of moderate interest to Year 7 students and which they considered not to be too difficult to write about. The survey results are summarized in Appendix G.

There was a consensus of opinion from different schools for each story topic. In 75% of story topics, the majority views in each school agreed with total tallies across schools rating a topic as “1”, “2 or 3”, or “4”. This consistency indicated that the interest and difficulty ratings were fairly reliable, although individual reactions to topics cannot be discounted.

Task Materials

Students were shown a colour copy of the web (as shown in Figure 1 in the Introduction) at the start of Phase B, and a colour copy of the wheel (as shown in Figure 2 in the Introduction) at the start of Phase C. These copies were enlarged to occupy a single sheet of A4 paper or an overhead transparency.

A lesson sheet was given to each student at the start of a session. It contained the story topic, which was typed in large (size 16) font on unlined A4 paper, and a summary of instructions for the particular writing strategy being used in that phase. Sample lesson sheets are attached in Appendix E. Verbal instructions reinforced the written steps on the lesson sheet. Students were told to plan for 5 minutes, draft for 5 minutes and revise for 5 minutes. Additional lesson sheets were used for homework.

In all sessions, the test sheet consisted of a separate sheet of unlined A4 paper with the topic typed in size 16 font at the top of the page. It was otherwise blank.

Test of Written Language (TOWL)

Writing skills were assessed using the Test of Written Language (TOWL) (Hammill & Larsen, 1995). A number of researchers have used this test to assess participants (Montague & Leavell, 1994; De La Paz & Graham, 1997; Zipprich, 1995). Swanson and Berninger (1996) rate the reliabilities of the 1988 edition of TOWL subtests as between .78 and .93. The TOWL consists of 10 subtests in all. Five subtests are based on reading, writing or correcting simple sentences, to demonstrate a “contrived” knowledge of vocabulary, spelling, punctuation, logical sentences and sentence combining (syntax). The other five subtests measure the “spontaneous” demonstration of this knowledge in writing a story within a 15-minute time limit. The story is analysed to assess specific skills in spelling, punctuation, contextual vocabulary, syntactic maturity and thematic maturity. These skills are applied while juggling all of the constraints associated with the writing process.

All subtest scores are converted to standard scores, so that teachers can compare the various subtest scores of the one child. This gives a skills profile for each participant, as shown in Table 2. Subtest scores are also normed across a representative sample of peers, so that teachers can compare the child’s skills with those of other children of the same age.

The spontaneous (story-writing) quotient and contrived (knowledge) quotient are calculated using the sums of the two sets of subtest standard scores. These quotients are then categorised according to normed levels, with the lowest level of writing described as “very poor”, and progressively better categories as “poor”, “below average”, “average”, “superior”, “above average” and “very superior”. In this thesis, all participants demonstrated below average or poor scores in either the spontaneous writing quotients and/or the thematic maturity standard scores.

The TOWL contains two story tasks (Test A or B). Test A was used to assess participants. The picture is a detailed black-and-white drawing of mammoths and hunters engaged in battle. The Thematic Maturity subtest assesses the story written in response to this picture. It measures the fluent expression of appropriate ideas using narrative conventions, such as story elements, paragraphing, sequences of events and relevant ideas. A marking key provides appropriate details for the picture.

Research Procedure

Setting

Four of the five students had lessons at their homes. The rooms were of a type which obstructed the view of the rest of the family and the house. All homes were in middle-class suburbs. Otto studied in an open classroom environment in a reading clinic. He was accustomed to this environment and worked well in this setting.

Session Procedure

Each session consisted of a lesson and then a test, with one story topic assigned to the lesson and a second topic assigned to the test. Every learning phase began with a session following a model-test sequence. Every learning phase followed a lead-test sequence. In the final maintenance phase, sessions consisted only of a test.

Session Times

One session was scheduled per week, usually occurring on the same evening each week. Students began early in second term and had a break of one to two weeks during the mid-year school holidays. For most of them, the break was scheduled at or near the end of Phase B. However, Theodore's schedule was delayed by about 5 weeks, as a sporting injury delayed his commencement. For him, holidays began soon after the onset of Phase B.

Each session took 35 - 45 minutes. Lessons normally took about 20 minutes, with 5 minutes to plan, 5 minutes to write, and 5 minutes to review. Lessons were longer if students needed more time to learn a strategy. A kitchen timer or digital watch was always visible to the student. Feedback took about 5 minutes and was conducted without rigid time constraints. Tests took 15 minutes: 5 minutes to plan, 5 minutes to write and 5 minutes to review. There was a short pause between each writing stage, while the timer was re-set and the student found paper and pens. Feedback was not given after tests. Each session concluded after the test story.

Lesson Format

Prompts & Feedback

During lessons, prompts were used in all stages of the writing process. These were individualised, but followed a sequence which began with general comments, gradually becoming more specific if necessary. Prompts were based on students' story content and questions, and the extent to which students conformed to instructions. When students could not think of anything to write, they were told to think about "who", "what", "where", "how" or "why". If the student was still unable to think of something to write, additional prompts directed attention to specific story content. For example, the teacher went back to the words used in the topic title, or reviewed the story so far and asked about a specific event or character.

Feedback on the complete story was given to students immediately after every lesson. Positive feedback was provided about ideas. The teacher volunteered personal views about the best part of the story, such as an idea or description. The “reader reaction” was not scripted or predetermined, and allowed sufficient flexibility to react genuinely and spontaneously to the story written in that session. Further structured feedback supplied one vocabulary correction or elaboration (e.g., “A better word to describe this could be ... ?”), and one spelling correction (e.g., “You spell ‘their’ this way ”). The teacher also corrected an aspect relating to the story planning. For example, confusing or repetitive storylines could be pointed out. Specific errors or praise varied depending on the story content, student interests, knowledge and skill levels. The most damaging or frequent errors would be targeted for correction first.

Feedback was constructive. The advice related to what the child needed to do to fix the problem, not what they had done to make the mistake. The teacher also sought the child’s opinions or ideas immediately after offering the correction. This gave students the opportunity to demonstrate that they understood and were capable of making suitable corrections. Feedback was delivered in a neutral way that aimed to avoid affronts to the student’s dignity or self-efficacy.

First Session: Modelling

In the first session in each phase, the teacher described how to plan a story using the strategy for that phase. The teacher then modelled the methodology by developing a plan for the set topic, although asking the students to contribute as much of the story content as possible. This helped students to remain actively engaged in the task. The teacher also offered story ideas, which the students were free to reject or adapt. The right to veto the teacher promoted active listening by students and reminded them that they were the authors of the stories. Planning lasted 5 minutes.

The teacher advised students that the next 5 minutes would be used for drafting the story based on the plan. The students then dictated a story. The teacher acted as a scribe, suggested words or phrases if necessary, and prompted students to say more.

This was done by asking the students questions about their ideas and sentences, suggesting that further information could be needed, and modelling “reader reactions” to content. One deliberate spelling error was made by the scribe.

After 5 minutes, the teacher began to review and revise. Students were prompted to spot specific semantic, syntactic and spelling mistakes, as well as to consider where they could add extra information to make the story better. The teacher still acted as scribe, but actively helped students to correct and add information.

At the end of the 15 minute lesson, the teacher read back over the story and praised one aspect of it. She then corrected the spelling error (if it had not already been corrected by the student), found a better word to describe something in the story, and commented on a way that the student could have planned their story more effectively.

Subsequent sessions: Guided practice

From the second session in each phase, students wrote under the teacher’s direction. The teacher did not collaborate on the story with the student or act as scribe, but continued to prompt students to write appropriate words and ideas when this was necessary.

Students completed the plan in five minutes, and spent a further five minutes in writing a draft copy of the story. In the final five minute-period, they wrote their own revisions. They were alerted to the need to finish the story after four minutes of the revision time had elapsed. After five minutes had elapsed, revision time finished and the teacher provided structured feedback, as in the first session.

Test Format

Every lesson was followed by a test story on a new story topic. This was timed and written independently by the student. No prompts or feedback were given.

Phase A: Baseline

Baseline Planning

Students were asked to rephrase the story title and then talk about what they could write in a story on that topic. If need be, the teacher explained a word in the topic and asked students to give an example of it, to ensure that they understood it. For example, several students did not know the meaning of the word “cosmic” in the story topic “Cosmic Zoo”. If students were unable to talk about story ideas, they were prompted to do so.

Baseline Writing/Drafting

In the first session (modelling/collaboration) the teacher did the writing and the student dictated. In subsequent sessions, the students did the writing but could ask questions about the writing process, e.g., spelling, punctuation, syntax, semantics. Students were told not to worry about handwriting provided it was legible, as it would be typed later. They were also told not to worry about spelling during the drafting stage as it could be fixed during the revision stage.

Baseline Reviewing and Revising

The students stopped writing after the timer sounded, put their pens to one side and read their story. All students were asked to pick up a coloured marker or pen before they began reviewing, so that they could make changes as soon as they spotted errors or thought of new information to add. In this phase, the students read their stories aloud before they revised.

This stage was an extension of the drafting stage. It was not proof-reading or making “good copies” of the draft. To review and revise, students had to recognise what they had written so far, correct surface errors such as spelling or grammar, correct semantic errors or elaborate on ideas, and add new ideas. All students except Theodore used most of the revision time to finish writing the story and embellish details. Sometimes, the teacher had to prompt the student to correct grammar, clarify meaning or supply more information. If a title had not been written yet, the student was asked to add one at this point.

Baseline Feedback

Positive feedback would be given about one or two aspects of the story worthy of sincere praise. This could be a novel idea, a difficult word spelled correctly, a descriptive word showing vocabulary development, or other aspects relating to the story-writing process. The teacher also asked specific questions about the story line to encourage students to clarify any confusion in their completed stories.

Post-revision feedback consisted of one spelling correction, one correction or elaboration on the meaning of a word, and one strategy suggestion involving story organisation or planning. This reviewed an aspect of transcription, translation and procedural knowledge, respectively.

Baseline Tests

A test followed the feedback. The teacher gave students a second story topic and explained that this was a test and that no help could be given. Students then spent 5 minutes describing their story ideas for a prescribed topic. The teacher listened and nodded to show that she was listening. Students planned, wrote and revised test stories without prompts.

Phase B: Web

Web Planning

In the first session (modelling/collaboration), the teacher drew a web using ideas from the student. In the second and subsequent sessions in Phase B, students drew the webs themselves. The story title was written in the middle of the page, circled, and surrounded by different ideas about the story. Students were encouraged to use different colours for different clusters of ideas.

Web Writing/Drafting

In the first lesson, the story was dictated with the teacher acting as scribe. In second and subsequent lessons, students wrote with guidance from the teacher. They were encouraged to consult their web plans and cross out circled ideas as they wrote them. This served as a “check-off” system (Martin & Manno, 1995).

Web Reviewing and Revising

After 5 minutes, the students revised, as described for Phase A. If they had not remembered to strike ideas from the web plan as they put them into sentences, the teacher prompted them to do this during the revision stage of the lesson.

Web Feedback

Feedback was structured as in Phase A, except that planning advice could be more explicit. This was because the web recorded ideas for discussion afterwards, e.g., “you could write more about that part of your plan” or “you should cross out your circles, so you know that you have written all of your ideas in your draft story”.

Web Tests

Each student then wrote a test story without prompts or feedback, using the same stages as in the lesson. The teacher did not prompt the students, other than to issue an occasional reminder to change pens.

Phase C: Wheel

Wheel Planning

In the first session, the teacher recapped the procedures learned and practised so far. She explained that students could plan using a wheel diagram. Students were shown a completed copy of a wheel (as shown in Figure 2 in the Introduction) and each story element was explained, in turn, as follows:

- *Place and time* meant where and when the story was set.
- *Hero and wants* told who the story was about, or the main person in the story. Wants motivated the hero's goals and explained what the hero wanted to have or do, and why.
- *Friends and enemies* meant the hero's friends and enemies, who helped the hero or prevented goals from being obtained.
- *Problem and plans* meant the problem stopping the hero from getting what he (or she) wanted, and plans for overcoming that problem.
- *Action and events* meant what the hero did and what events happened around him or her. This required students to understand the difference between the hero's actions and events outside of the hero's control.
- *Results and ending* meant the results of the hero's action, whether the hero succeeded in obtaining what he or she wanted, and what happened to the people in the story.

As each story element was explained, the teacher gave an example, checked that students could re-phrase the story element in their own words, and asked them to provide an example of the story element from their favourite TV programs. The wheel plan was then modelled. The teacher wrote the plan, using ideas from the student. From the second lesson in Phase C, the students wrote the plan themselves. From the third session in Phase C, students had to write the plan from memory. During lessons, recall errors were corrected immediately.

The students drew the wheel by writing the topic in the centre of a blank page, then drawing a circle around the title. Another circle was drawn around this and the resulting tube was divided into six segments. The students then wrote a pair of story elements within each segment as follows: place and time, hero and wants, friends and enemies, problems and plans, actions and events, and results and ending. These headings were written in a clockwise direction before adding specific ideas related to the story topic for each element. Students were asked to memorize the diagram and headings over the next 2 weeks. It was explained that they could use their own words to describe the story grammar terms rather than the terms which had been given to them. However, all students preferred to use the words supplied. If students could not reproduce the headings fluently, within two lessons, the teacher supervised extra (timed) practice in memorizing terms and writing the diagram quickly.

Wheel Writing/ Drafting

The teacher first modelled the translation of the first plan into a story, acting as a scribe and prompting the students to devise sentences for each story element. Then from the second lesson, students wrote the story themselves.

Wheel Reviewing and Revising

Students revised their stories as they had in Phase B.

Wheel Feedback

After the planning, writing and revising subtasks had been completed, the teacher queried those parts of a story that did not make sense, praised efforts, and corrected three points relating to vocabulary, spelling and strategy. Feedback on the wheel strategy included misinterpretations or omissions of story elements.

Wheel Tests

Students were given a blank page containing a second story title, and were expected to write a test story using the wheel strategy to plan, draft and review.

Phase C2: Modified Wheel

Only Theodore participated in this phase. This strategy focused on syntax.

Modified Wheel Planning

Theodore planned his stories as he had in Phase C, with teacher prompts when needed. The plan was not modelled, as this process was identical to Phase C.

Modified Wheel Writing/Drafting

The teacher explained that this part of the procedure had changed. Theodore was asked to say each sentence aloud before writing it into the story draft. The procedure was modelled in the first session. Theodore dictated the story as before, except that he was asked to pause after each sentence. If the sentence was grammatically correct, the teacher wrote it for him. If the sentence was not correct, he was asked to rephrase it. Prompts became more specific after each incorrect attempt

by the student to rephrase the sentence. Writing did not proceed until he had generated a grammatically correct sentence. An additional 5 minutes was allowed in the drafting stage during Phase C2 *lessons* to enable this feedback to occur.

In the second and third lessons, Theodore composed the sentence aloud, and paused for feedback from the teacher. Theodore wrote correct sentences into his story. If the sentence was incorrect, the teacher advised Theodore to re-phrase it. The same prompting procedure was used as in the first session.

Modified Wheel Reviewing and Revising

Theodore revised his stories as he had in Phase C, with teacher prompts when needed. As in previous phases, he was encouraged to add ideas to the story and not merely change punctuation or word choices.

Modified Wheel Feedback

After the student had completed the story, the teacher provided feedback, as in previous phases.

Modified Wheel Tests

Theodore was given a test sheet containing a new story title, and wrote a test story. In the first 5 minutes, he planned the story using the wheel diagram. He then took five minutes to draft the story, composing each sentence aloud prior to writing it. Under test conditions, the teacher did not provide feedback after each sentence. Instead, Theodore was expected to listen to his sentence, pause to think about it, and rephrase it if *he* believed it was incorrect. Once Theodore believed that his sentence was correct, he wrote it into his draft. He then spent 5 minutes reviewing and revising the completed story, as previously.

Phase D: Maintenance

Lessons ceased to be part of the sessions in Phase D. Students were tested to see if they maintained gains over baseline using a written planning strategy. The order of the strategies was alternated so that the same strategy did not always occur first (refer to Appendix F). Again, students spent 5 minutes talking about what the story could contain, 5 minutes writing it and 5 minutes revising. Oral planning was alternated with *one* of the written planning strategies. When students used the written planning strategy, they followed the same test procedures as they had in Phases B or C for that particular strategy. When they used the oral planning strategy, they followed the same procedure they had used in baseline tests.

Sebastian and Philbert wrote one story per session, with strategies randomly alternated from one week to the next. They were asked to write test stories using the story grammar wheel, and oral planning in alternate sessions. Due to time constraints, Theodore and Fred wrote two stories per session. In some sessions, these students used the oral planning strategy first; in others, this strategy was used for the second story. To alternate strategies, Fred used the web and Theodore used the modified wheel. Otto didn't participate in Phase D as he had withdrawn from school.

Midweek Data Collection

One homework story topic was scheduled each week. Written instructions provided the topic and strategy steps. The parents or class teachers were asked to supervise the practice sessions. It soon became obvious that students would vary in the amount of homework completed. Therefore, each student was asked to complete only as much homework in Phases B and C as he had done in Phase A.

Every student had the same amount of additional home or class practice in each phase. Comparisons between different phases show the effects of planning strategies rather than of varying quantities of homework practice outside lesson time.

Homework was intended to assist the child to remember the strategy learned in that week's lesson, to build writing fluency, and to help transfer gains.

Transfer Probes

Students were expected to transfer gains when instructed to use the web strategy in different tasks or settings. Transfer of gains would be measured for only one dependent variable: number of words. At the end of Phase B, Fred and Philbert were asked to write a web story under test conditions in a classroom setting. Fred was also asked to use the web strategy to write a report. Suitable titles were selected from the list of topics not yet used by that child for homework, lessons and tests, such as "Television" or "Sea Creatures" (refer to Appendix G). The number of words was recorded for these transfer probes. If time was available, transfer of baseline or wheel strategies was also tested to keep procedures consistent between phases.

Transfer to a classroom setting was tested by sending homework story topics to Fred's classroom teacher. Fred wrote a baseline story in class at the end of Phase A. He then used the web strategy to write a story in class at the end of Phase B. Philbert used the web strategy to write a story in a small group setting when a homework story topic was sent with him to an after-school reading clinic.

Transfer to a different task was tested for Fred who was asked to write a report using the web strategy in the usual one-to-one setting. The wheel strategy was also tested in this way. At the end of Phase C, Otto, Fred and Philbert were asked to write a report using the wheel strategy. To do this, the wheel diagram had to be adapted to a different genre. The students were told to think of new headings which they could use to write a report and to write these down in the wheel diagram instead of writing the story element headings. They were told to add their own ideas on the set topic next to each heading.

Scoring Procedures

Number of Words

Students' stories were typed onto a computer, verbatim. If students had split one word into two, this was corrected. Spelling and syntax errors, however, were not corrected. The title was counted. The word count tool in the word processing software was used to supply the total number of words for each story. Examples are provided in Appendix H.

Number of Propositions

Phrases were cut and pasted from each sentence, using the word processing software on a computer to make a list of simple sentences, each consisting of a noun and verb. Examples of how to derive propositions from sentences are provided in Appendix C. If the student used an adverb or adjective, the phrase was copied to form two simple sentences, with one containing the extra detail. The teacher counted the simple sentences derived in this way from each story, and recorded the total as the number of propositions in the story.

Story Elements

For scoring purposes, story elements were put into 5 categories:

- setting (with 2 story elements: time and place),
- characters (with 4 story elements: hero and wants; friends and enemies)
- initiating event (with 2 story elements: problems and plans),
- complication (with 2 story elements: actions and other events), and
- resolution (with 2 story elements: results and ending).

The teacher read each test story and categorized its story elements. Students received one point for use of each story element, with a *maximum of two points per category*. With 5 categories per story, this allowed a maximum score of 10 points. In order to receive a point, an element had to serve its function in the story framework. To do this, it had to relate to other elements in the story. For example, in a story about a boy losing his dog, a point would be given for an “ending” about that boy or that dog. A point would not be given for supplying an ending which involved neither the boy nor the dog. This ensured that the points were awarded for genuine story elements - that is, components within a narrative framework.

Relevance

Relevance was rated by finding phrases in the story which related directly to the meaning of the prescribed story title. These were underlined. The rater then looked for sentences before or after this central point. Relevant phrases had to elaborate upon the central point and make logical sense to the reader. This variable measured whether students wrote sentences containing ideas which were relevant to the topic. A rating of 1 was given to stories which were not relevant to the topic question, or where only a very small proportion of the story contained relevant ideas. A rating of 2 was given to stories which were moderately relevant. In these stories, roughly half of the sentences were relevant. A rating of 3 was given to stories in which all or almost all of the sentences were relevant to the topic.

Interrater reliability was calculated for the relevance scores of 20 stories, and agreement was obtained for 14 (70%) of these. This is similar to the 72 - 74% interrater agreement used by Martin and Manno (1995) for coherence and organisation. These researchers used the term “coherence” to reflect the logical flow of ideas and events. The term “organisation” was based on subjective ratings about stories making sense and integrating characters’ actions with storylines.

Syntax

Syntax was not a dependent variable, but this had to be assessed in Theodore's stories in order to evaluate his responses to the interventions. The errors were syntactic errors as defined in TOWL (Hammill & Larsen, 1995). Errors were tallied in each of Theodore's test stories from Phase A to D. Only one error was counted in each phrase. Examples are italicized in Appendix H.

Ethical Considerations

The teaching methods and research task were explained to students and parents before the program began, so that they could make an informed decision about participation. Correspondence requesting parental consent is provided in Appendix D. All students agreed that they were willing to co-operate by attending lessons in their homes or at a reading clinic after school. Parents were asked to check regularly to make sure that their child agreed to continue participating in the program. Family privacy was respected and assurances were given that students would not be identified in this thesis. Pseudonyms were used to describe each participant.

CHAPTER FOUR

RESULTS

Over a period of 6 months, students spent 20 hours learning to plan, compose and review narratives. An oral planning strategy was used in baseline sessions, followed by a self-generated web in the first intervention, and a story grammar wheel was used as the second intervention. A final phase tested maintenance of gains. Number of words, propositions and story elements increased for all students. Relevance improved for three students. Gains made in each strategy were maintained. Two students wrote longer stories using a written planning strategy when this was alternated with the oral planning strategy at maintenance. Students did not transfer peak gains to another setting or genre.

This chapter reports individual results, beginning with the youngest student and finishing with the eldest. Dependent variables are reported in two groups. Numbers of words and propositions often varied in the same direction for each student, and are presented together. These two variables are referred to as *productivity* measures. Unless otherwise mentioned, references to “story length” reflect number of words. Relevance and story elements were grouped together as *content* variables, because changes in these variables did not follow the same patterns as productivity variables.

Means are shown in tables for each student. Tables list the mean, range and standard deviation for the four dependent variables in Phases A, B, C and D and in the modified wheel intervention, Phase C². The maintenance of baseline is identified as Phase D^A and interventions are labelled Phase D^B (web) or D^C (wheel). The tables include the percentage of completely relevant test stories for each full phase.

Graphs show changes in dependent variables across and within each phase. Trend lines are coloured for clear and easy reference, with deteriorating performance in red, and improvement in green. Trend lines will not be visible if they duplicate

phase levels, shown by blue median (central tendency) lines. Transfer probes were conducted on an ad hoc basis and were not included in graphs. Summaries of strategy responses, maintenance and transfer data are given later in the chapter.

Sebastian

The number of words and propositions increased from baseline levels after Sebastian began to use the web to plan stories. This productivity gain halted at the onset of Phase C, although story elements and relevance increased. In Phase D (baseline/wheel), Sebastian improved productivity and relevance variables, regardless of planning strategy, but further gains did not occur in story elements.

Table 4
Productivity in stories written by Sebastian

Phases	A	B	C	D ^A	D ^C
Number of Words					
Mean	102.7	116.2	93.0	182.5	150.0
Std. Dev.	17.0	13.1	27.1	34.6	1.4
Min.	86	97	50	158	149
Max.	120	132	140	207	151
Number of Propositions					
Mean	22.3	29.2	22.4	43.5	43.0
Std. Dev.	6.0	4.4	5.3	6.4	1.4
Min.	16	23	14	39	42
Max.	28	36	31	48	44

As shown in Table 4, Sebastian wrote more words and propositions in Phase B, compared to Phases A and C. Story length dropped by 23 words between the end of Phase A and the onset of Phase B, but improved in the second session and exceeded the Phase A range by the third session. Stories were very short in the initial wheel sessions, but number of words peaked later in Phase C. A drop of 61 words occurred between the final session in Phase B and the onset of Phase C. Figure 7 shows upward trends in productivity in Phases A, B and C.

In Phase D^A, stories ranged from 158 to 207 words, an improvement upon the initial baseline range of 86 to 120 words. At maintenance, these orally planned stories were longer than those written using the wheel strategy. There was no overlap between the number of words for the two strategies. In the final session, Sebastian used the oral planning strategy to write his longest story of 207 words.

Table 5
Content ratings in stories written by Sebastian

Phases	A	B	C	D ^A	D ^C
Story Elements					
Mean	7	7.1	8	7.5	7
Std. Dev.	1	0.7	1.6	2.1	1.4
Min.	6	6	5	6	6
Max.	8	8	10	9	8
Relevance					
Mean	1.3	1.7	2.1	2.5	2
Std Dev.	0.6	0.8	1	0.7	1.4
Min.	1	1	1	2	1
Max.	2	3	3	3	3
Frequency of rating "3"					
% of sessions	0%	16%	42%	50%	50%

Table 5 shows little difference between numbers of story elements in Phases A and B. An upward trend in story elements during Phase B but not in Phase C, is shown in Figure 8. Instead, the level of story elements was high from the onset of Phase C. In Phase D^A, orally planned stories contained more story elements than in Phase A, but there was no further increase in story elements beyond Phase C levels.

Mean relevance improved in Phase B from baseline levels, and there was an upward trend in relevance ratings. Relevance improved further in Phase C, as shown in Table 5. While Phase A baseline stories were *never* completely relevant, test stories in Phases B and C were completely relevant in 16% and 42% of sessions, respectively. Stories were most relevant most frequently when using the wheel strategy. However, in Phase D, both orally planned and wheel planned stories were completely relevant 50% of the time.

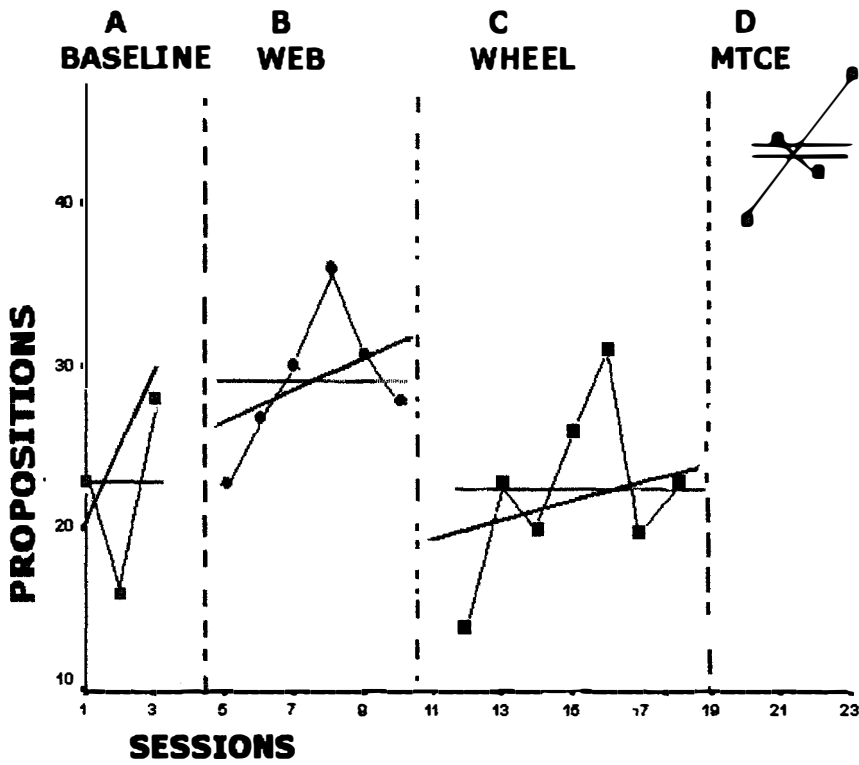
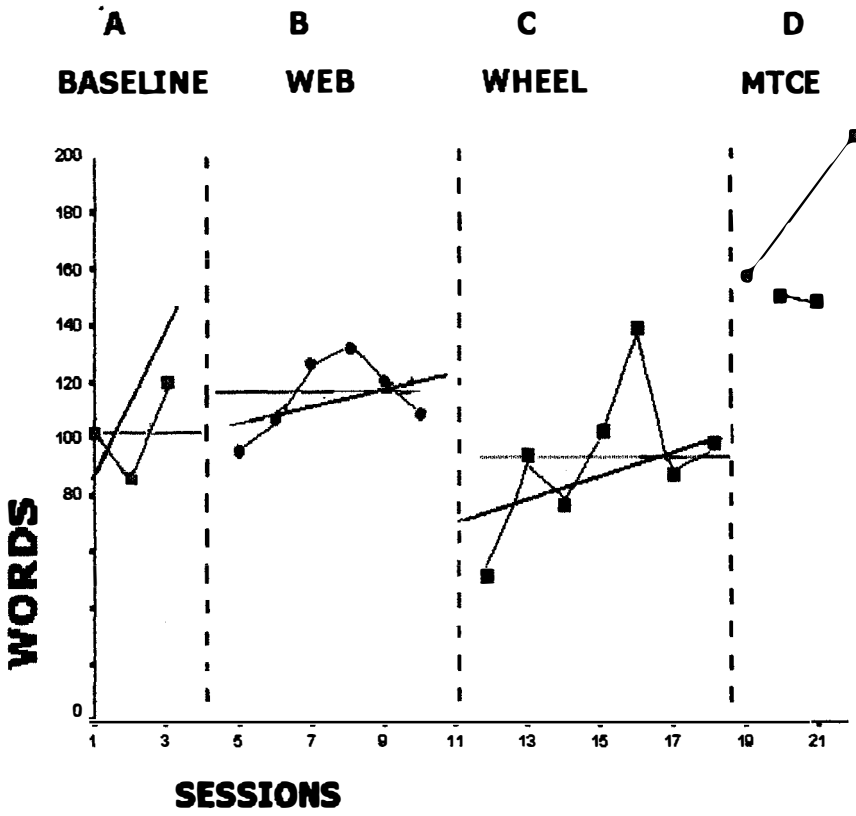


Figure 7. Number of words and propositions in stories written by Sebastian.

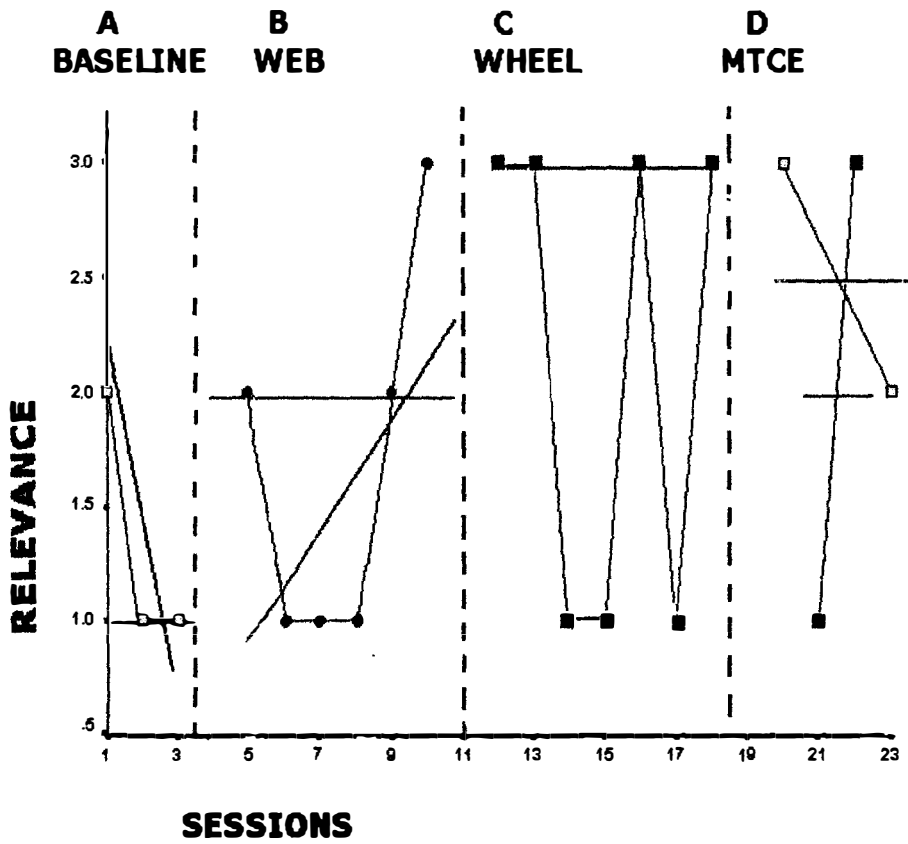
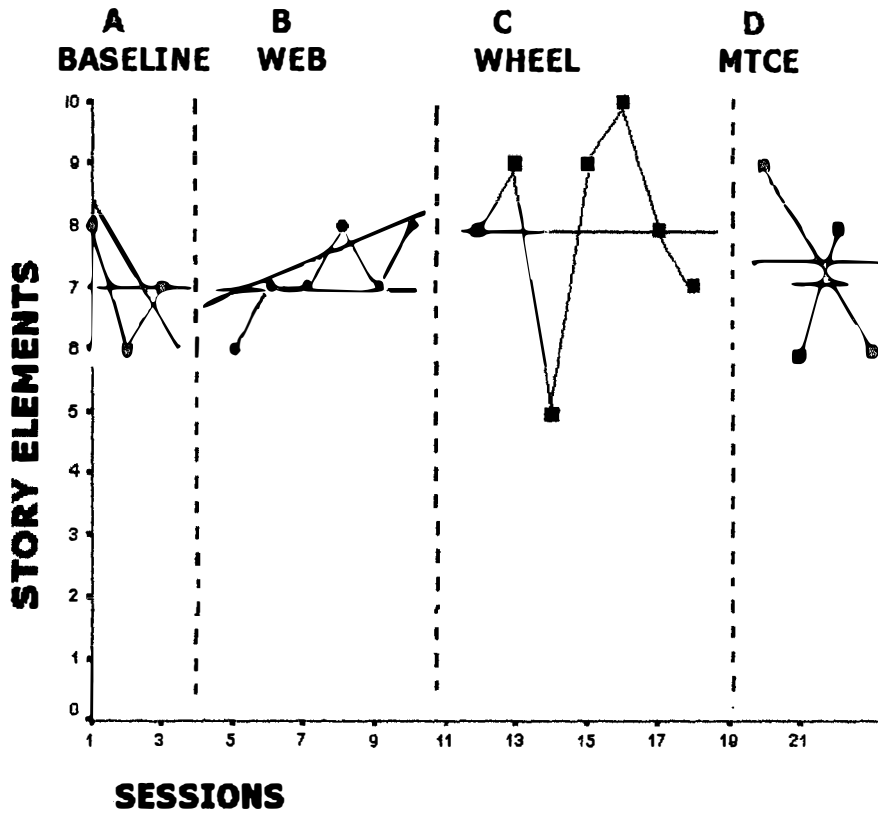


Figure 8. Story elements and relevance in stories written by Sebastian

Fred

Fred wrote his longest stories when using the web strategy. Mean story length exceeded 100 words only when using the web strategy. Fred's Phase D^A stories improved upon Phase A performance, but web stories were longer (in words and propositions) and contained more story elements than orally planned stories in both learning and maintenance phases.

Table 6
Productivity in stories written by Fred

Phases	A	B	C	D ^A	D ^B
<u>Number of Words</u>					
Mean	53.0	114.8	58.2	68.0	109.0
Std. Dev.	26.5	17.8	30.1	43.0	19.5
Min.	25	95	20	19	94
Max.	82	137	99	96	131
<u>Number of Propositions</u>					
Mean	12.5	28.6	13.8	15.0	18.6
Std. Dev.	6.4	7.2	7.4	10.4	5.5
Min.	6	20	3	3	3
Max.	18	36	24	22	25

Fred's productivity more than doubled between Phases A and B, as seen in Table 6. While there was a slight upward trend in numbers of words in stories in Phase A, numbers of words and propositions rose consistently in Phase B. As shown in Figure 9, there was no overlap between stories using the web strategy and shorter baseline stories. Mean productivity dropped at the onset of Phase C. There was no upward trend in words and a downward trend was visible in propositions. When using the wheel strategy, story length was erratic and generally little better than baseline. Since Fred responded well to the web strategy, and poorly to the wheel method, the web was used in Phase D. The mean scores in Table 6 show a replication of the productivity advantage for stories planned with the web rather than orally.

Table 7 shows that the mean number of story elements rose from 3 in Phase A to 6.6 in Phase B. The maximum number of story elements in any story in Phase A was 5, out of a possible score of 10. Only one or two story elements were included in stories which were less than 40 words long. In Phase B, Fred's stories were longer and contained between 6 and 8 story elements. Story element scores were erratic in Phase C. With the exception of two stories containing less than 40 words, the stories in Phase C included between 5 and 8 story elements. This was equivalent to the range in Phase B. In Phase D^B, the mean number of story elements rose to its highest level. These gains were not maintained in Phase D^A.

Table 7
Content ratings in stories written by Fred

Phases	A	B	C	D ^A	D ^B
<u>Story Elements</u>					
Mean	3.0	6.6	4.8	4.0	7.3
Std. Dev.	1.8	0.9	2.7	2.6	1.2
Min.	1	6	2	1	6
Max.	5	8	8	6	8
<u>Relevance</u>					
Mean	3.0	2.8	2.3	2.7	3
Std Dev.	0.0	0.4	0.8	0.6	0
Min.	3	2	1	2	3
Max.	3	3	3	3	3
Frequency of rating "3"					
% of sessions	100%	80%	50%	67%	100%

Fred consistently wrote highly relevant stories during baseline and web phases. As shown in Figure 10, relevance declined in the second half of Phase C, coinciding with story lengths of only 20 and 26 words. In Phase A, these very short stories were nevertheless completely relevant. In Phase D, web stories were always completely relevant, and 2 of the 3 baseline stories were completely relevant. Mean relevance was only slightly higher for stories in Phase D^B (web) than in Phase D^A (oral planning).

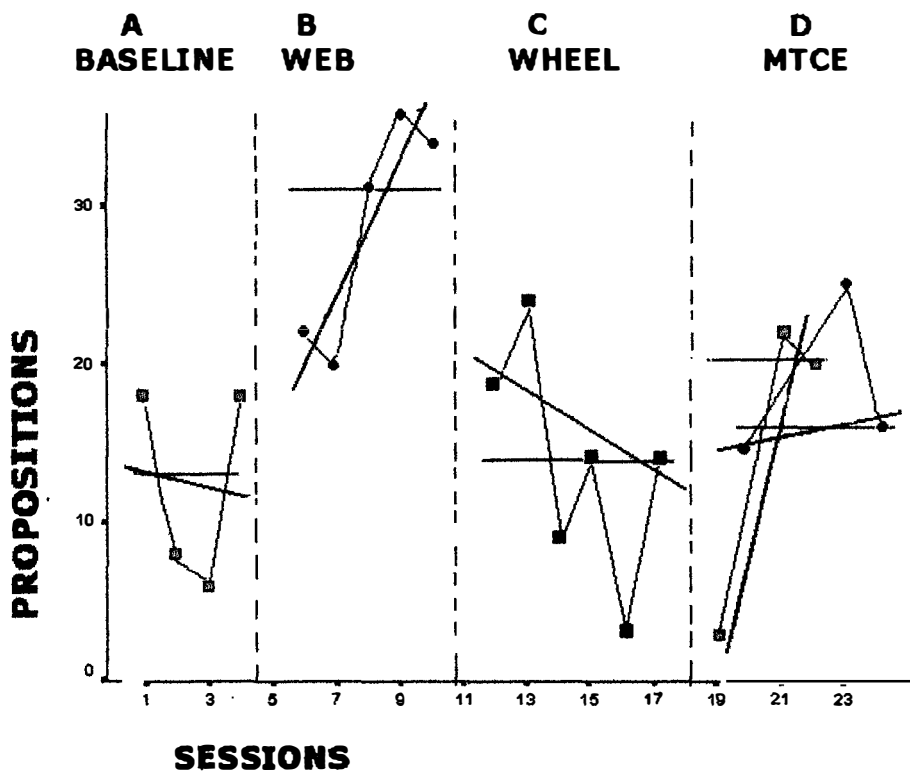
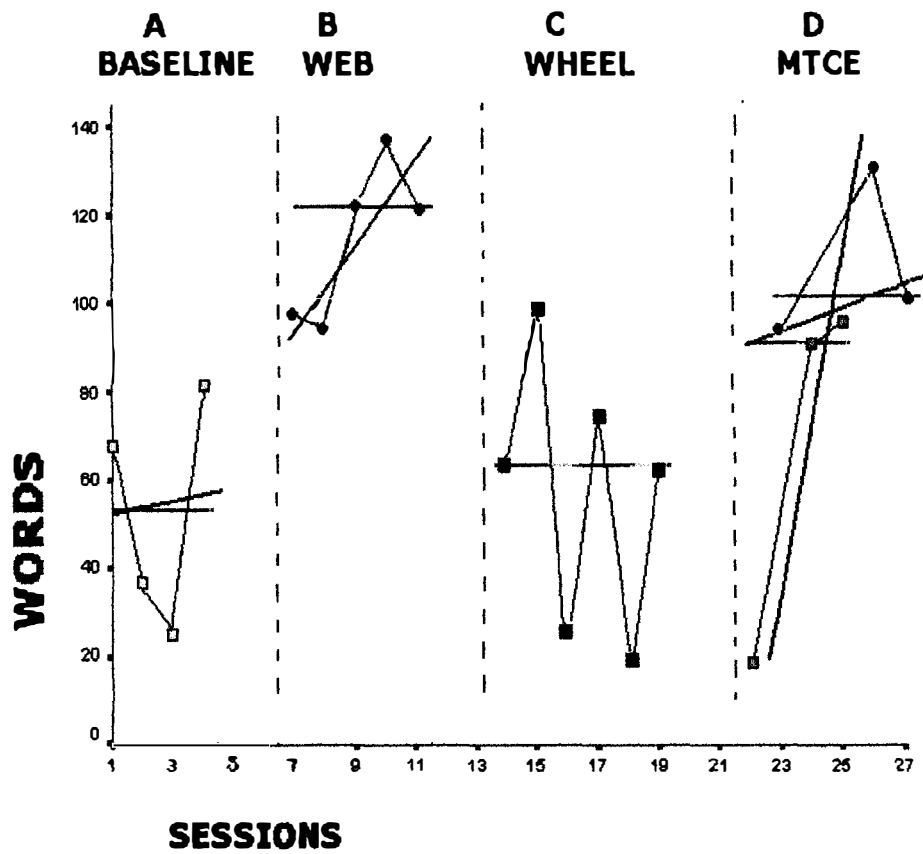


Figure 9. Number of words and propositions in stories written by Fred.

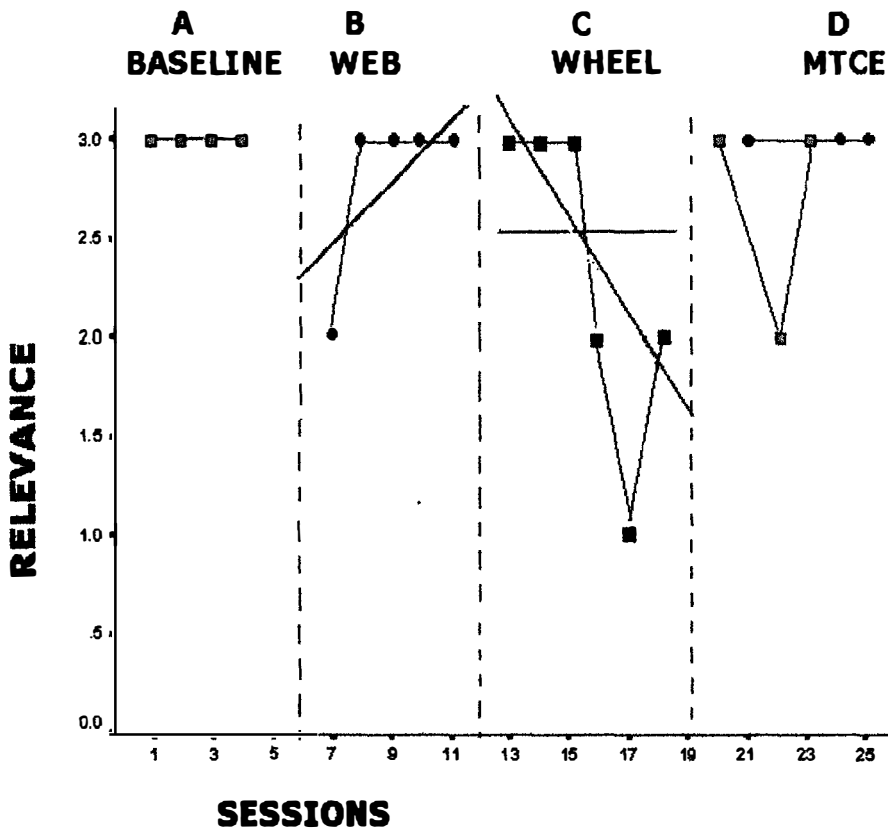
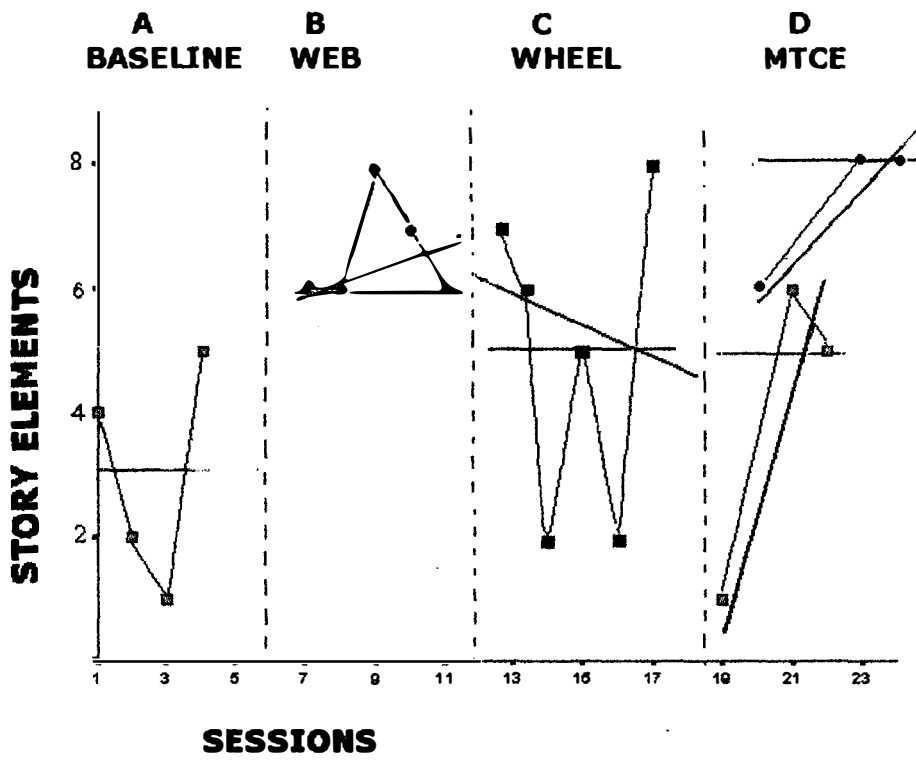


Figure 10. Story elements and relevance in stories written by Fred.

Philbert

Philbert's stories improved in all dependent variables during Phases B and C. There was no drop in number of words at the onset of each of the writing strategies. A reduction in numbers of words, propositions and story elements occurred in Phase D^A, replicating the wheel strategy advantage over baseline.

Table 8
Productivity in stories written by Philbert

Phases	A	B	C	D ^A	D ^C
Number of Words					
Mean	78.7	110.2	138.3	122.0	159.0
Std. Dev.	19.7	19.5	14.0	19.8	15.7
Min.	56	88	123	100	147
Max.	92	142	160	137	177
Number of Propositions					
Mean	27.3	29.5	37.7	29.3	34.6
Std. Dev.	1.1	8.1	5.2	7.5	3.2
Min.	26	18	34	22	31
Max.	28	39	49	37	37

Table 8 shows that the mean number of words and propositions increased in Phase B compared to Phase A. Four web stories contained more words than any of Philbert's baseline stories, with a phase overlap of only 5 words. As shown in Figure 11, productivity was erratic in Phases A and B, but Phase B showed upward trends in words and propositions. Productivity increased further in Phase C. There was no overlap between Phases A and C in words or propositions. Mean baseline story length was 60 words less than the mean for Phase C stories using the wheel strategy. Productivity did not increase in later sessions, and Figure 11 shows a downward trend across Phase C.

The differences between baseline and wheel productivity were replicated in Phase D. Although stories were longer (in words) in Phase D^A compared to Phase A, oral plans and the wheel strategy data did not overlap at maintenance. Philbert's

longest story of 177 words (containing 10 story elements) was written using the wheel strategy.

Content variables are summarised in Table 9, showing that gains occurred in the intervention phases. In Phase B, the mean number of story elements rose from 3 in Phase A to 6.1, and increased again to 8.1 story elements in Phase C. Generally, for Philbert, more story elements corresponded to more words. There was a phase overlap of 2 story elements between Phases B and C, as shown in Figure 12. This greater use of story elements was maintained when using the wheel strategy, but not when using the oral strategy.

Philbert wrote no completely relevant stories at baseline, but relevance improved in Phase B. Ratings for web and wheel stories were similar, with a mean relevance of 2.1 in Phase B and 2 in Phase C. Three web stories and two wheel stories were completely relevant to the story topic, as shown in Figure 12. In Phase D, stories were usually completely relevant, regardless of strategy.

Table 9
Content ratings in stories written by Philbert

Phases	A	B	C	D ^A	D ^C
Story Elements					
Mean	3.0	6.1	8.1	5.3	9.3
Std. Dev.	1.0	1.9	1.2	1.2	0.6
Min.	2	4	7	4	9
Max.	4	9	10	6	10
Relevance					
Mean	1.3	2.1	2	2.7	2.3
Std Dev.	0.6	1.0	0.8	0.6	1.2
Min.	1	1	1	2	1
Max.	2	3	3	3	3
Frequency of rating "3"					
% of sessions	0%	50%	28%	67%	67%

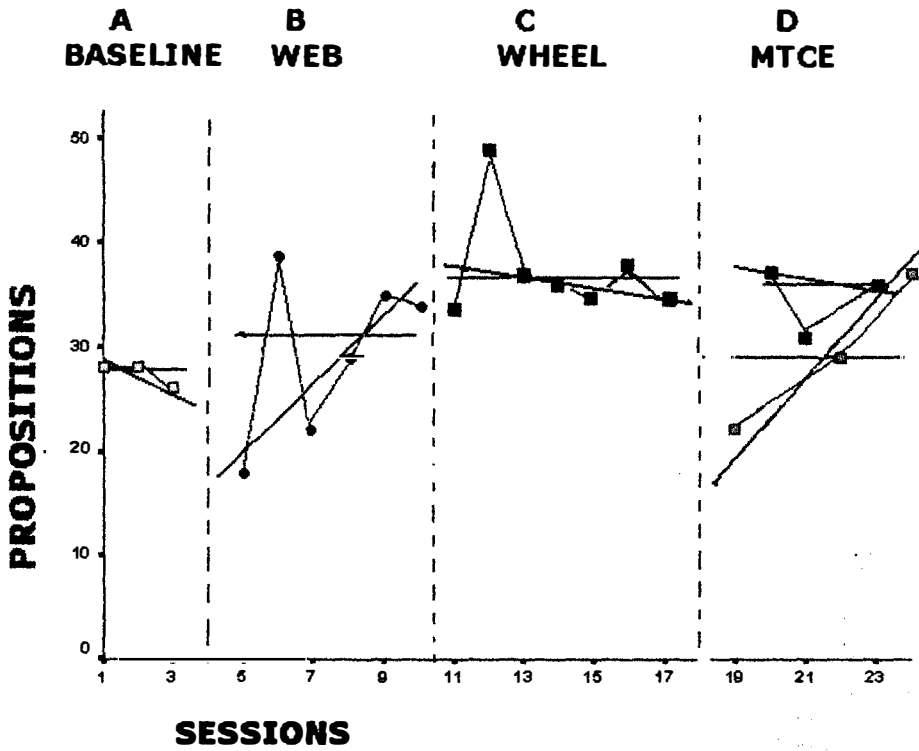
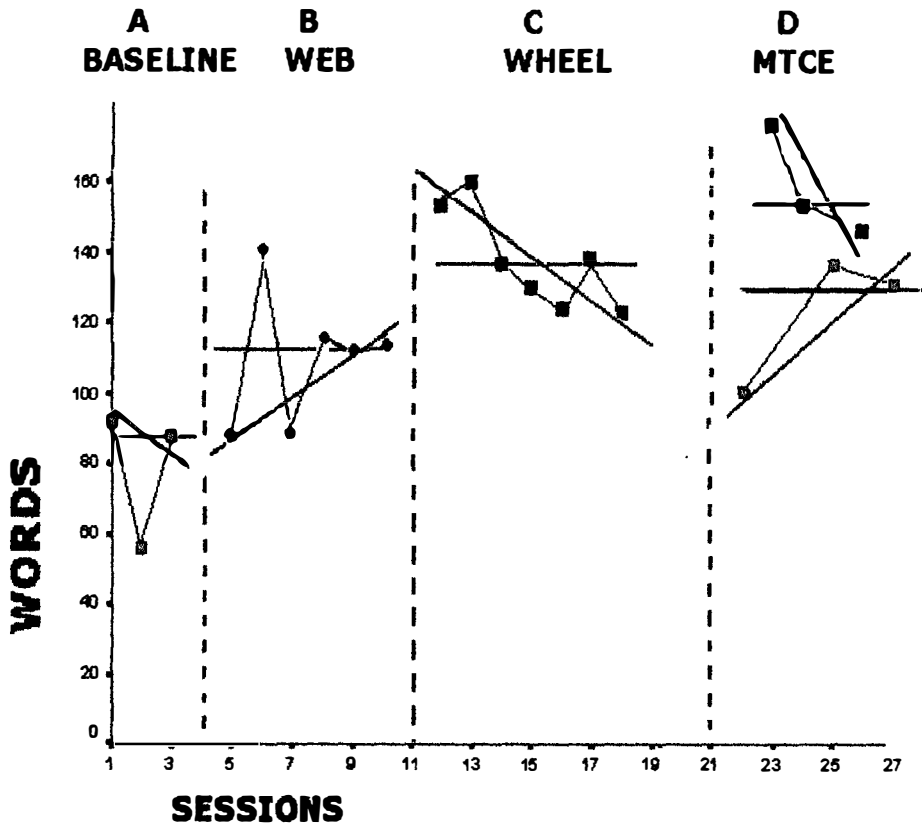


Figure 11. Number of words and propositions in stories written by Philbert

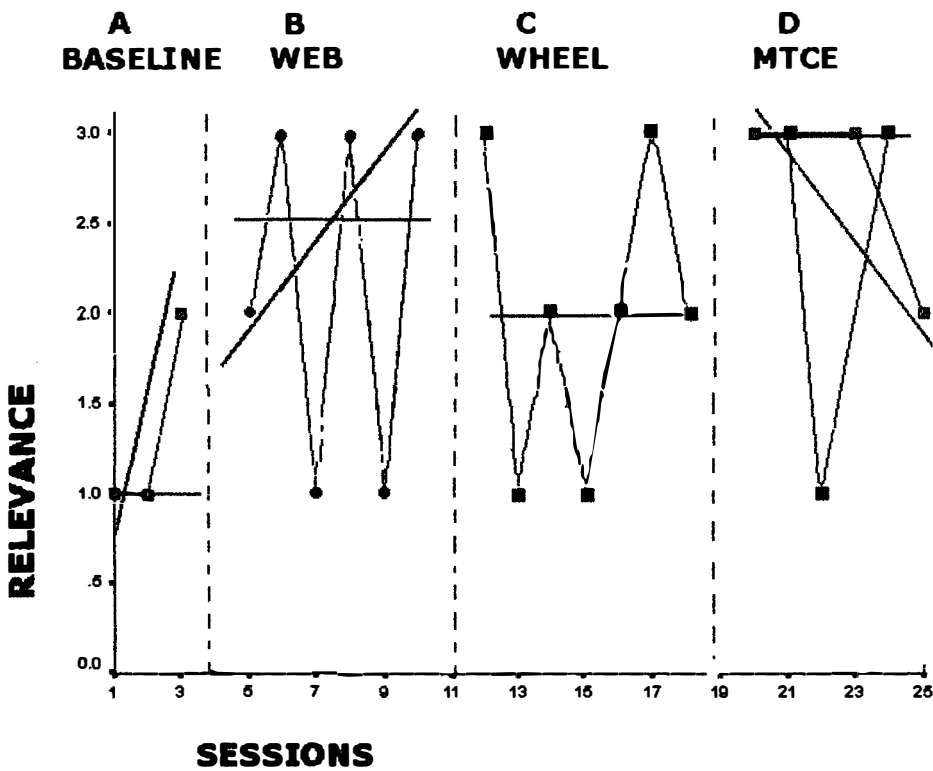
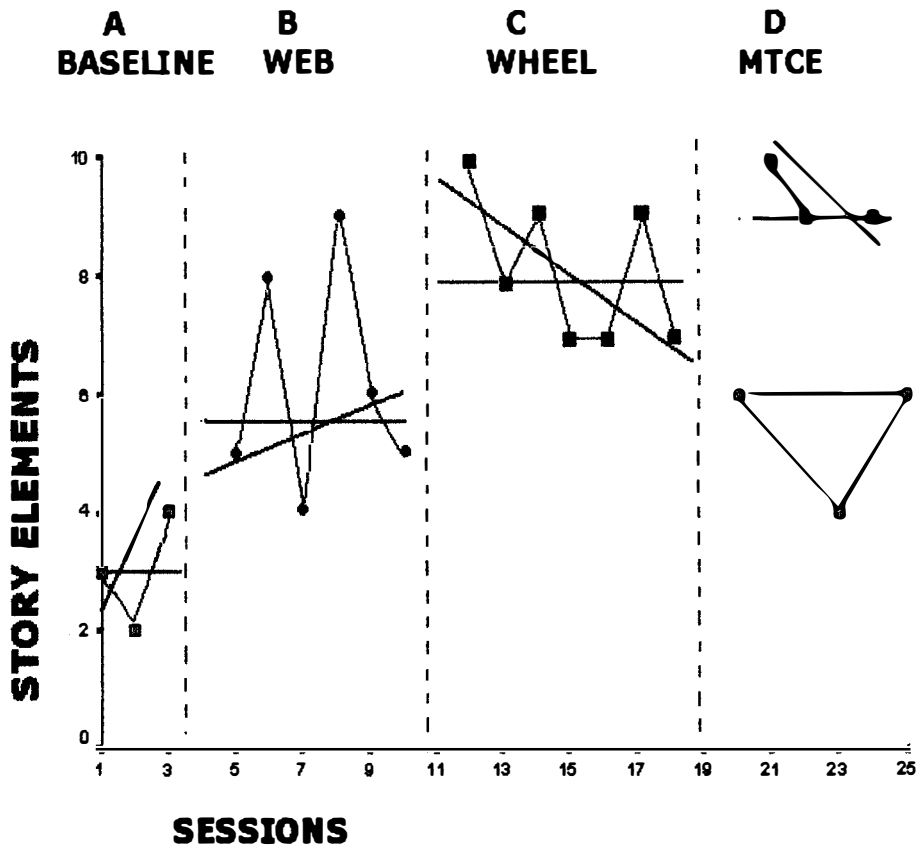


Figure 12. Story elements and relevance in stories written by Philbert.

Theodore

Theodore gradually improved productivity and story element scores across Phases A and C, despite erratic results in Phase B. During Phase C and C², the mean number of words, propositions, story elements and relevance increased from Phases A and B. He wrote longer baseline stories in Phase D^A than in Phase D^{C2}.

Table 10:
Productivity in stories written by Theodore

Phases	A	B	C	C ²	D ^A	D ^{C2}
Number of Words						
Mean	89.3	79.2	93.6	100.7	112.5	99.5
Std. Dev.	20.3	27.3	18.4	16.8	9.2	21.9
Min.	73	41	71	86	106	84
Max.	112	117	114	119	119	115
Number of Propositions						
Mean	21.3	18.3	20.8	17.3	28.0	22
Std. Dev.	2.3	7.2	6.0	2.1	1.4	4.2
Min.	20	10	12	15	27	19
Max.	24	30	28	19	29	25

As shown in Table 10, the mean number of words fell from 89.3 in Phase A to 79.2 in Phase B. At the onset of Phase B, story length dropped by 47 words from the final Phase A session. Mean number of propositions also fell at the start of Phase B. Productivity during Phase B varied, as shown in Figure 13, finally enveloping Phase A, peaking at 117 words in his longest web story after a minimum of only 41 words in the same phase. Mean number of words increased in Phase C, compared to Phases A and B. However, story length did not exceed 117 words. Instruction methods were reviewed at this point and Phase C was modified. The first test story in Phase C² was 119 words - an improvement on the Phase B maximum. The mean number of propositions was higher in Phase C than in Phase B, but the Phase C range did not exceed that of Phase B. The number of propositions declined from the

onset of Phase C². Theodore used more words to convey fewer ideas when using the modified wheel strategy.

In Phase D^{C2}, the mean of 99.5 words when using the modified wheel strategy was similar to the mean of 100.7 words in Phase C². In Phase D^A, orally planned stories were longer than they had been in Phase A. Theodore wrote longer stories in Phase D^A than in Phase D^{C2}. The productivity advantages of the modified wheel strategy were superseded by oral planning at maintenance.

Table 11
Content ratings in stories written by Theodore

Phases	A	B	C	C ²	D ^A	D ^{C2}
<u>Story Elements</u>						
Mean	6.7	5.2	7.8	9.0	9.0	8.5
Std. Dev.	0.6	2.1	1.6	1.7	1.4	0.7
Min.	6	2	6	7	8	8
Max.	7	7	9	10	10	9
<u>Relevance</u>						
Mean	2.0	2.0	2.2	3.0	2.0	2.5
Std. Dev.	1.0	0.9	1.0	0.0	1.4	0.7
Min.	1	1	1	3	1	2
Max.	3	3	3	3	3	3
<u>Frequency of rating "3"</u>						
% of sessions	33%	33%	67%	100%	50%	50%

As shown in Table 11, story elements ranged from 6 to 7 in Phase A. In the first web session, the number of story elements dropped to 2. Performance recovered later in Phase B, as shown in Figure 14. Theodore wrote a maximum of 7 story elements in Phases A and B. At the onset of Phase C, story elements increased from the levels shown in previous phases, with three stories containing 9 story elements. Stories improved further in Phase C², with two of the modified wheel stories incorporating 10 story elements. In Phase D, there was little difference between baseline and wheel strategies in story elements, with high means of 9 and 8.5 (respectively).

Only a third of Theodore's stories in Phases A and B were completely relevant. Ratings improved in Phases C and C². All stories written during Phase C² were completely relevant. In Phase D, relevance decreased slightly, with 50% of stories completely relevant to the story topic. The mean relevance was higher for the modified wheel than the oral planning strategy.

Syntax

Syntax was not a dependent variable, but was monitored because this was a major part of Theodore's writing difficulties. TOWL subtests had shown that syntax knowledge and skills were poor in contrived tests as well as when writing stories. This problem continued throughout Phases A, B and C and needed to be addressed in order for Theodore's writing to improve. It was also possible that poor syntax skills were confounding his responses to the teaching interventions, as measured in the dependent variables.

Syntax improved in Phase C², and Theodore also wrote longer, completely relevant stories containing more story elements than in previous phases. Appendix F shows the number of errors in syntax in each session. Stories averaged one error per 40 words in Phases A, B and C. This declined to one error for every 100 words when using the modified wheel strategy, a rate which was maintained for this strategy in Phase D.

During Phase D, baseline error rates rose to one in 20 words. However, the rate subsided late in the phase. The final baseline story rate was extremely well-constructed, with only 1 syntactic error in the story (106 words). Theodore's stories became easier to understand, and story element and relevance ratings also improved.

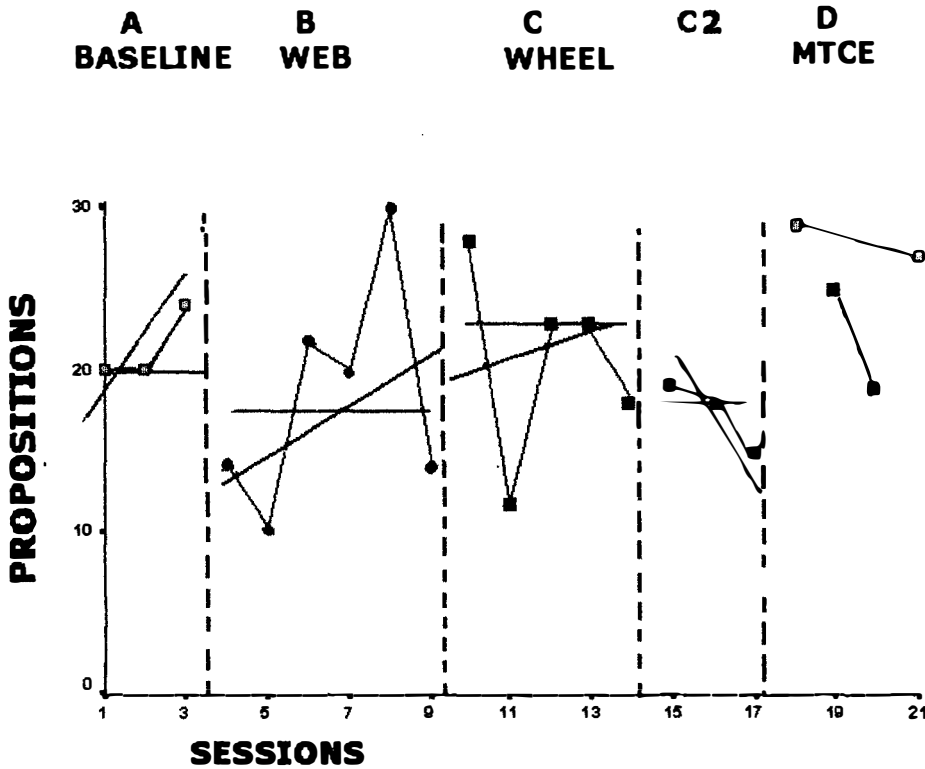
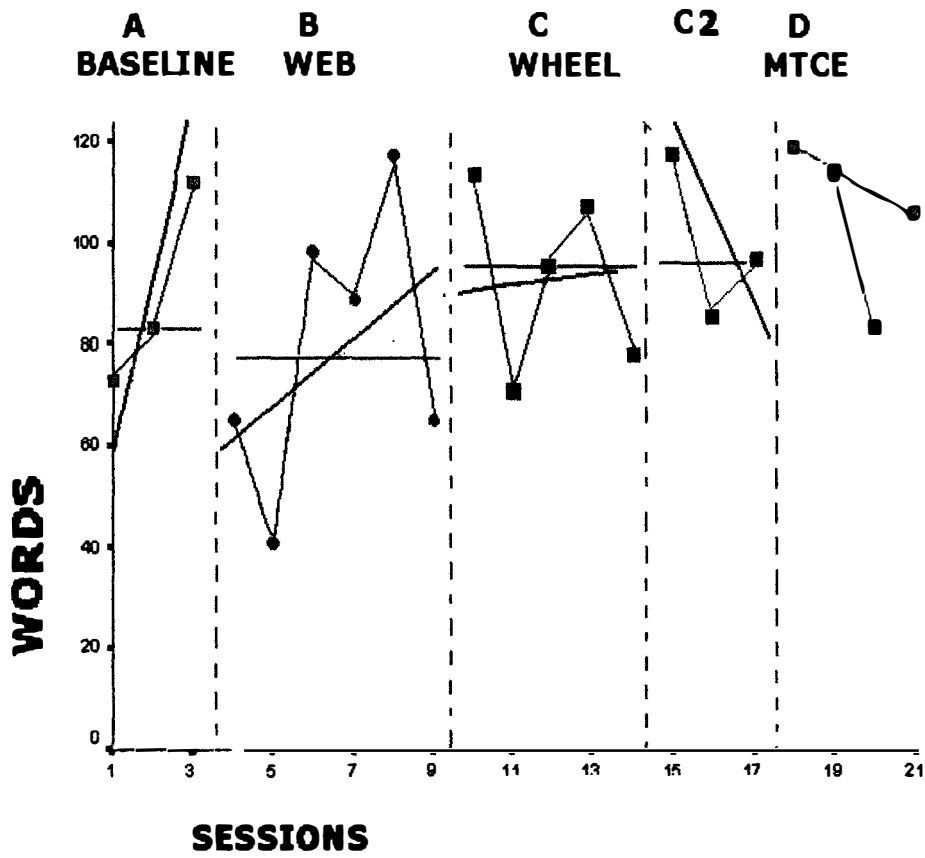


Figure 13. Number of words and propositions in stories written by Theodore.

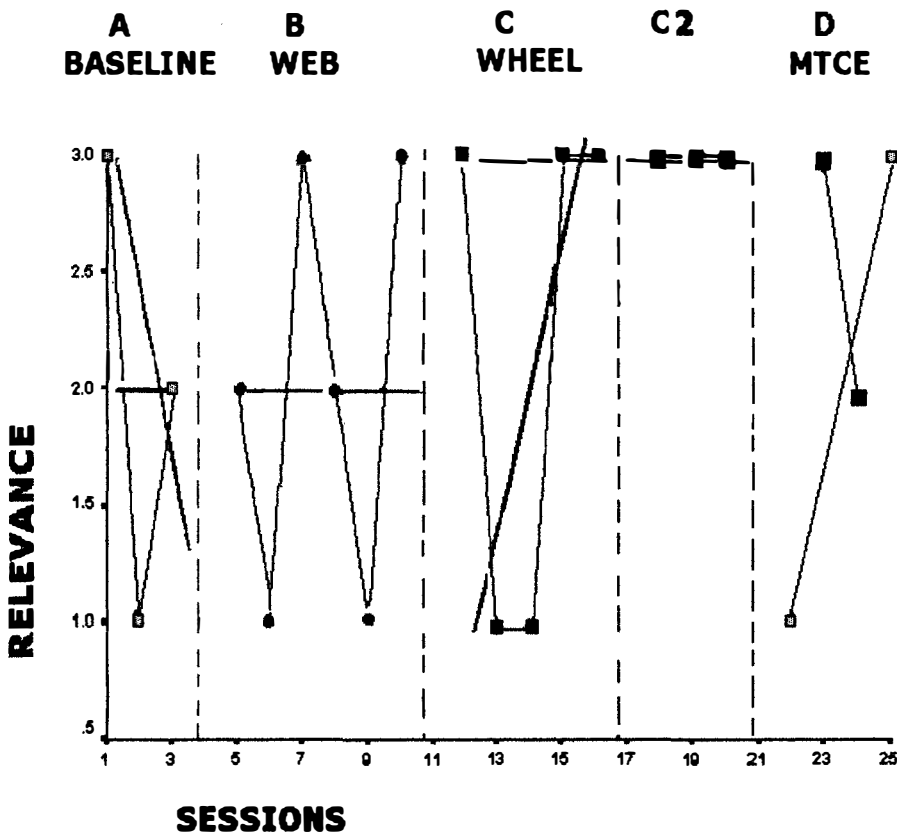
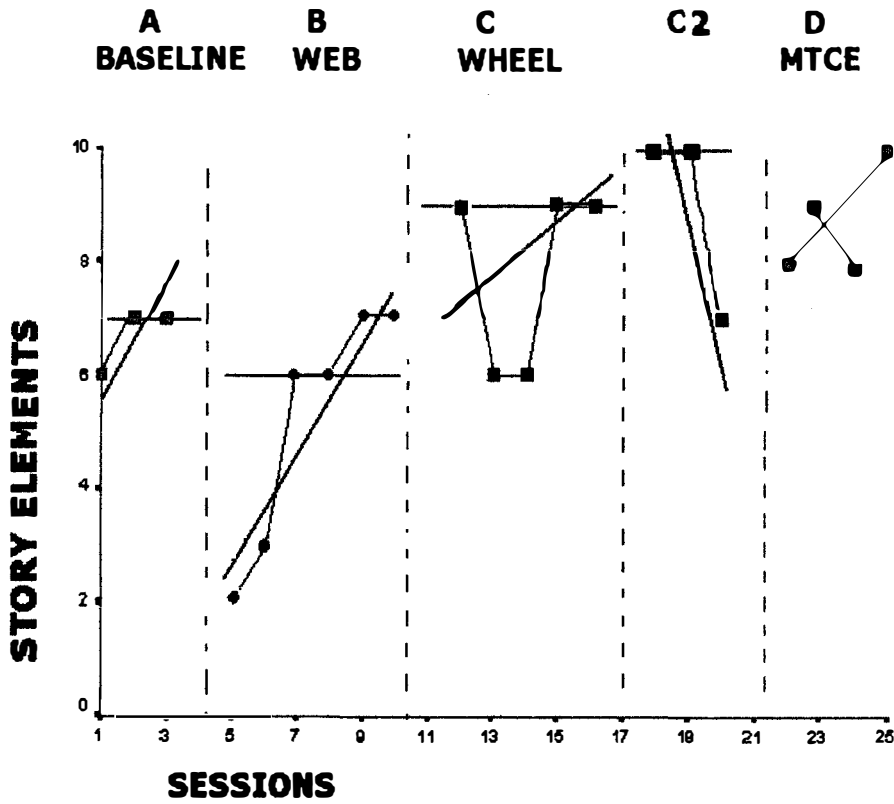


Figure 14. Story elements and relevance in stories written by Theodore.

Otto

Otto tended to write more propositions in Phase B than in Phases A or C. He wrote slightly more words and story elements when using the wheel strategy, compared to baseline and web planning. Relevance did not rate highly throughout the program. Otto did not participate in Phase D because he was withdrawn from school at the start of Term 4.

Table 12
Productivity in stories written by Otto

Phases	A	B	C
<hr/> Number of Words <hr/>			
Mean	103.2	104.6	113.3
Std. Dev.	9.6	16.7	9.7
Min.	88	90	96
Max.	114	132	122
<hr/> Number of Propositions <hr/>			
Mean	26.6	30.0	26.3
Std. Dev.	3.2	6.2	4.4
Min.	22	19	21
Max.	30	34	33

Otto frequently wrote shorter stories in Phase B than in Phase A, but the mean number of words and propositions increased from baseline levels (see Table 12). Figure 15 shows an upward trend in number of propositions across web sessions. Otto had not shown this improvement in number of propositions across sessions in Phase A. The mean number of propositions was higher in web stories than in wheel or baseline stories.

Otto also wrote his longest story of 132 words at the onset of Phase B. As shown in Table 12, the mean number of words was higher in Phase B than in Phase A. Story length did not increase beyond this maximum during Phase C, but he wrote longer stories more consistently in Phase C than in earlier phases. The mean of 113.3 words per story using the wheel strategy was higher than earlier phase averages. There was also an upward trend in number of words across the Phase C, but this did not extend to number of propositions.

As shown in Table 13, Otto wrote more story elements in Phase C compared to earlier phases. The mean number of story elements increased from 5.8 in Phase A to 8.1 in Phase C, and the range had also lifted by Phase C. Story elements increased from the onset of Phase C, with 9 out of a maximum of 10 story elements in four of the six wheel sessions. Number of story elements declined in the final two sessions in Phase C, as seen in Figure 16.

Relevance did not improve in intervention phases compared to baseline. Mean relevance was rated as 2 during Phase A. Stories were completely relevant in only two of the five baseline sessions. Mean relevance ratings decreased to 1.4 in Phase B, and a declining trend was noticed across the web sessions. During Phase C, a slight upward trend is noticeable, but only two of the six wheel stories were completely relevant. Mean relevance in Phase C was less than that in Phase A.

Table 13
Content ratings in stories written by Otto.

Phases	A	B	C
Story Elements			
Mean	5.8	6.2	8.2
Std. Dev.	1.6	2.5	1.6
Min.	4	2	5
Max.	8	8	9
Relevance			
Mean	2	1.4	1.8
Std Dev.	1	0.6	1
Min.	1	1	1
Max.	3	2	3
Frequency of rating "3"			
% of sessions	40%	0%	33%

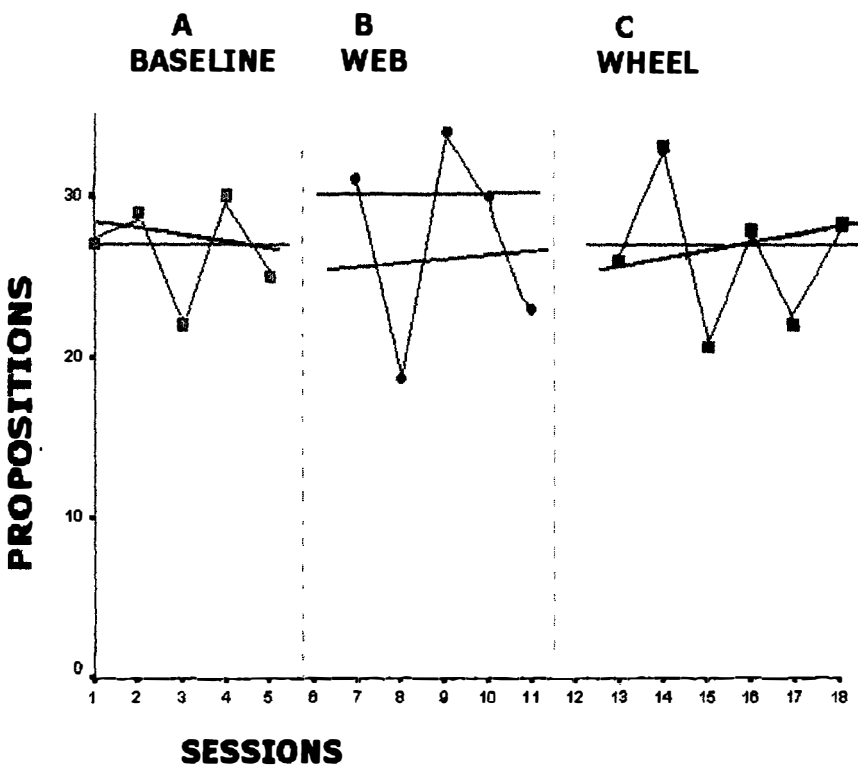
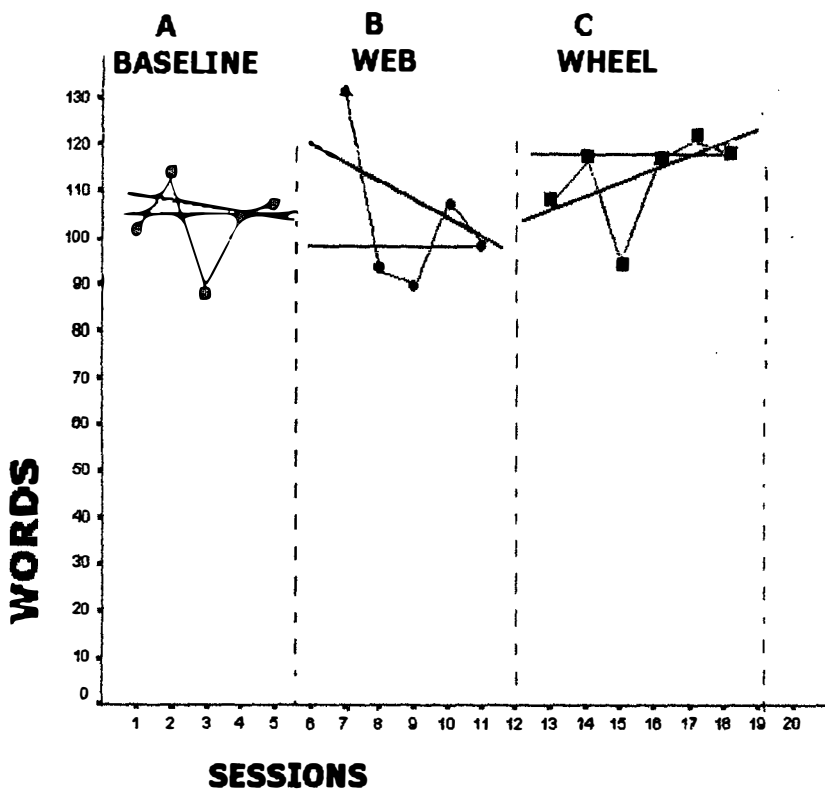


Figure 15. Number of words and propositions in stories written by Otto.

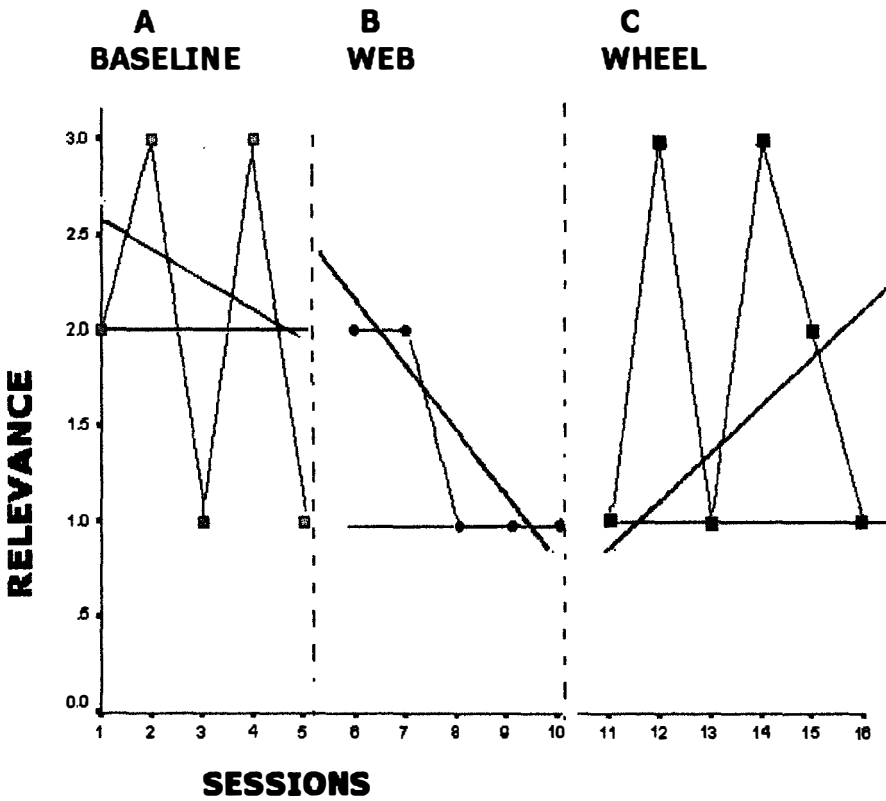
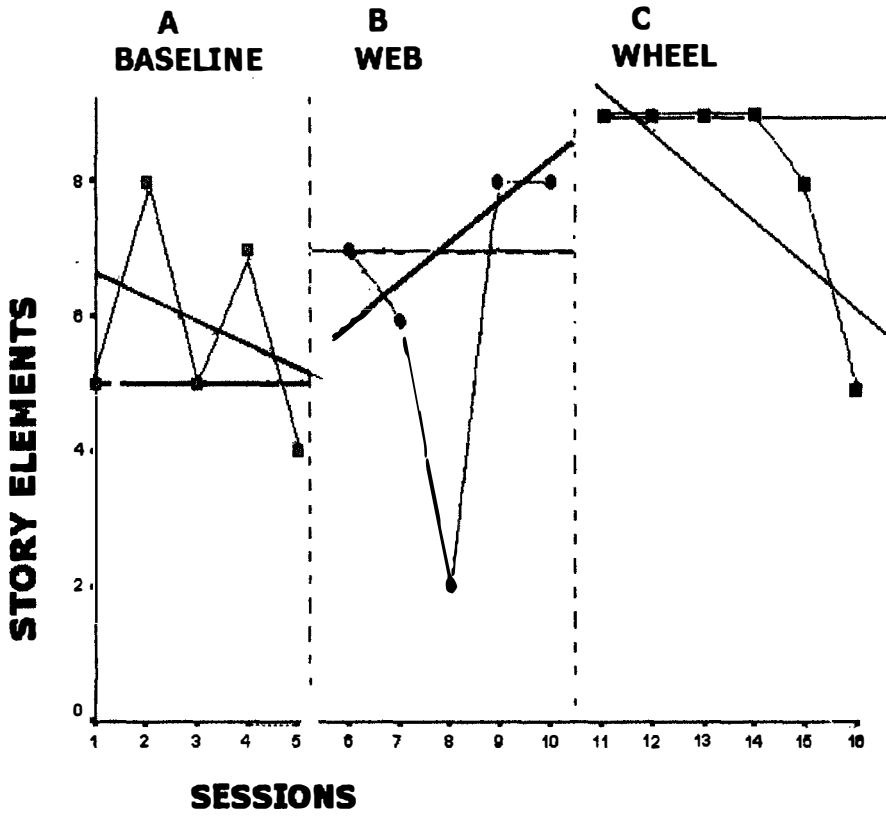


Figure 16. Story elements and relevance in stories written by Otto.

Maintenance & Transfer

Four students participated in Phase D. All maintained the gains made with the written planning strategies, and improved the productivity and content of orally planned stories, compared to baseline. There were individual variations in the extent of gains made for each planning strategy. During the learning phases, Sebastian and Fred wrote their longest stories using the web, and Otto, Theodore and Philbert wrote their longest stories using the wheel planning strategy. At maintenance, Sebastian and Theodore wrote longer stories when planning orally rather than in writing. Fred and Philbert wrote longer stories when using written, rather than oral strategies.

Sebastian maintained gains in story length, number of ideas and both content variables. He had Phase A means of 102 words and 22 propositions, and did not write any completely relevant stories at baseline. In Phase D^A, means were 182 words and 43 propositions, with 2 of the 4 stories completely relevant to the topic. Sebastian maintained gains when using the wheel strategy, but he wrote longer stories in Phase D^A than in Phase D^C.

Fred had Phase A means of 53 words and 12.5 propositions, and finished Phase D with a mean of 109 words and 18.6 propositions in web stories. His mean story element score was 3 in Phase A and 7.3 in Phase D^B. His stories were relevant from Phase A onwards, although ratings became erratic in Phase C. In Phase D, he wrote longer stories with more story elements when using the web strategy to plan stories rather than when planning orally.

Philbert improved story length and content measures. He had Phase A means of 79 words and 27 propositions, ranging from 2 to 4 story elements. He finished Phase D with means of 160 words and 35 propositions, ranging from 9 to 10 story elements. He wrote no completely relevant stories in Phase A, but two thirds of his stories were completely relevant across Phase D. In Phase D^C, he wrote longer stories with more story elements than in Phase D^A.

Theodore improved from a mean of 89 words and 21 propositions in Phase A to a mean of 112 words and 28 propositions in Phase D^A. In Phase D^A, stories contained more story elements, and more words relevant to the topic, than in Phase A, when stories were also planned orally. *Theodore* wrote one completely relevant story in the three Phase A stories, while 2 of the 4 maintenance stories were completely relevant. One of these stories was planned orally, and the other used the story grammar wheel. He wrote longer stories in Phase D^A than Phase D^{C2}.

Transfer to a different setting or task was tested for four students. Tests were conducted at the conclusion of each phase, but only if there was sufficient time for an additional session. A report genre was used for some transfer tests, so story elements were not measurable. To enable comparisons with narrative tasks, number of words was recorded. The results showed little evidence of peak strategy gains transferring between settings or genres.

Fred wrote two stories in the *classroom setting*. He wrote an 80-word story using the baseline strategy in class. This exceeded the Phase A mean, but fell well short of the peak gains achieved in Phase B. Fred's classroom web story was only 65 words long, despite an excellent plan. While Fred's greatest gains were achieved using the web strategy, these were only obtained in the one-to-one setting. At the end of Phase B, Philbert wrote a 101 word web story when placed in a *small group setting*. This was within the web range of 88 to 142 words, but the length was below that found in the later web stories written just prior to this test.

Sebastian, Otto and *Theodore* did not complete tasks in other settings. Homework stories were completed, but without supervision. This was a different setting, as the homework environment did not contain the usual instructor. However, results cannot be compared with test stories because times were not recorded by an independent observer. Sebastian was the only student to complete homework every week.

Fred used the web strategy to write a composition in a *different genre* but in the usual one-to-one setting. He wrote a 53-word report using the web strategy. This

was below the minimum range for narratives in Phase B. There was no evidence that web gains would transfer to the report genre without instruction in that genre.

Three students used the wheel strategy to plan and write a report. However, none of these students could independently generate suitable headings. In each case, the teacher assisted them by providing report headings. Fred's report, using the wheel strategy, was 68 words long. This was consistent with Phase C means but Fred did not write well using this strategy even in a one-to-one setting. The wheel report exceeded the earlier web report length, but both reports were well below peak gains achieved when using the web strategy. Philbert's report was 83 words long - a reversion to baseline story lengths, and shorter than the stories written using the same planning strategy for narratives in Phase C. Otto wrote a 101-word report using the wheel strategy. This was below the mean for Phase C. Results did not show automatic transfer of wheel strategy gains to a different genre.

Summary

General trends in students' responses to strategies were noticed. Productivity and story element gains are summarized in Appendix I. All students except Theodore made greater productivity gains in Phase B than in Phase A. Theodore also wrote his maximum number of propositions in Phase B but performance was erratic. Over a period of 10 sessions, peak gains in productivity occurred in Phase B for each student, regardless of the prior duration of baseline. For all students except Fred, the introduction of the wheel improved levels of story elements. Fred's maximum number of story elements in Phase C matched that of Phase B, but Phase C performance was inconsistent and mean length dropped. Gains made with intervention strategies were maintained by all students but the advantage over baseline was replicated only for Philbert and Fred. This was not due to performance lapses at maintenance, but to gains when Theodore and Sebastian repeated the baseline strategy in Phase D.

CHAPTER FIVE

DISCUSSION

All students demonstrated improvements in dependent variables when using one of the written planning strategies to draft their stories. The goal of improving students' written expression skills was achieved for narrative tasks cued by a story topic in the one-to-one setting. This chapter outlines the extent to which initial hypotheses were supported. Each hypothesis is treated separately. The hypotheses are re-stated, supporting or contrary data are summarized, individual results are discussed and general observations are made about students' responses. Research limitations are acknowledged and future research directions are suggested. The chapter concludes by discussing teaching implications.

Web Productivity

There were two hypotheses regarding the web. The first hypothesis stated that when students used a self-generated web, they would write more ideas and words than under baseline conditions. This was supported by data from Fred, Philbert and Sebastian. For Otto and Theodore, web planning was not associated with substantial productivity gains, compared to the oral planning strategy used at baseline. The second web hypothesis stated that students would maintain and transfer this strategy. Fred was instructed to use the web strategy in Phase D, and the results replicated the advantage of written over oral planning. To this extent, the second web hypothesis was supported. Transfer probes for Philbert and Fred provided no support for transfer of web strategy gains to a different task or setting.

The web hypotheses were based on the expectation that this strategy would lead to fewer task demands than in baseline, reducing the effort and capacity needed to write stories. Rapid gains in productivity occurred, as anticipated, following the change from baseline to the web task materials. This was most visible in

propositions. Students also developed writing skills over the course of Phase B after further instruction, feedback and practice.

Sebastian

Sebastian wrote more words and propositions in stories planned from webs than in stories planned orally. It could be argued that practising mechanical writing skills in three sessions in Phase A increased writing speed in Phase B, and that Sebastian expressed more propositions because he could transcribe words more quickly by the second phase. However, Sebastian's results do not show a linear progression in writing speed from Phase A, extending across Phase B, and the number of propositions increased more noticeably than number of words. Lesson data show that Sebastian dictated a longer web story than its baseline counterpart, suggesting web advantages in a task that did not involve transcription at all.

The web planning task may have contributed to improved numbers of propositions. Idea generation has been described as a "higher order" skill not amenable to practice effects but vulnerable to working memory deficits (Swanson & Berninger, 1996). The inclusion of more propositions within the set time limit is consistent with expectations that the web would free working memory resources for storing and retrieval of more ideas while writing.

Upward trends across Phase B cannot be due to a strategy which was held constant. It can be explained by a reduction in executive effort across the phase. As he became more familiar with the task, Sebastian may have made fewer decisions about procedure. This could lead to less hesitation and effort, increasing the amount of time he had available to find ideas and write words. Productivity trends in this phase suggest less effort in translation may have contributed to improved rates of words and ideas in later web sessions. Task design and practice could interact and increase fluency in story production.

Fred

Fred wrote more words and propositions when using the web, and story length declined when oral planning was alternated with web planning in Phase D. Several factors may have contributed to Fred's web gains. Firstly, instruction time was increased in lessons (but not in tests) when he had difficulties in developing ideas in plans. In the PW2R approach, the teacher assists, reminds and responds to each student as an individual (Berninger, Abbott, Whitaker, Sylvester & Nolen, 1995). Secondly, one-to-one supervision was provided in tutoring sessions. This may explain the lack of transfer of gains to the class setting. It does not explain the advantage for one strategy, as time and supervision were aspects of instruction which were applied in the other phases, too. Similar gains were not seen in other phases. Differences must be explained by factors specific to the planning method.

For Fred, the web strategy may have been intrinsically motivating. He showed an active interest in the construction of web stories. For example, he wove coloured artwork and graphic effects into the web plans, and wrote interesting sound effects into web story drafts. He seemed to have had more fun writing web stories, compared to stories using the other planning strategies. However, the fact that Fred did not use the web unless instructed to do so suggests that motivation was not an overriding factor in performance gains. He may have been motivated because he found the strategy easy. The web strategy could have reduced constraints on working memory, facilitating the storage, retrieval and writing of more ideas.

Fred wrote longer stories with more practice in Phase B. Improved fluency could be indirectly linked to task design. If the task reduced effort and increased output, this necessarily increases the amount of writing which is practised. Also, a growing familiarity with the procedure could increase writing time. Fred appeared to spend longer periods of time writing, as opposed to increasing the speed of his handwriting. This is speculative, as active writing time was not recorded.

Philbert

Story length exceeded the baseline range from the second test in Phase B. There was only a gradual upward trend across web sessions. Story length became more consistent rather than climbing steadily. This suggests that the change in task, rather than practice, contributed to increased productivity. The web task seems to have reduced the effort needed to translate ideas, allowing a trade-off to improve the level of productivity in words and propositions. The explanation is supported by anecdotal observations from the first lessons in Phases A and B, when the teacher acted as scribe. Philbert's dictated baseline story was 118 words long. His dictated web story was longer (148 words). This suggests that the web strategy assisted translation skills. The increase wasn't due to faster transcription, since mechanical skill was not involved in the dictated story.

Theodore

At the onset of Phase B, Theodore's stories were shorter than those for baseline. This coincided with the end of Term 2 in his first year at high school, and may reflect fatigue or the unfamiliar web task demands. Theodore also had difficulties in spatial maths and mapping skills, suggesting that he could find a diagram daunting. He may have worked harder to encode material into the visuospatial sketchpad than into the phonological loop, or found the procedure confusing and needed time to organise and co-ordinate his movements between the paper containing the plan with the paper containing the draft.

Until Theodore mastered the diagram, the spatial format may have imposed additional demands on working memory or executive control. Later in the same phase, he wrote longer web stories. Upward trends were noticed in propositions and words. The fluency gains in later sessions could have been due to the PW2R routine and familiarity with the planning procedure freeing effort for translation, while

practice improved speed in mechanical writing skills. This could also explain the trend in Phase A.

Propositions improved to a greater extent than number of words in Phase B. Poor syntax may impose its own constraints on story length measured in words. These problems were not reduced by the introduction of the web strategy. The web task design did not seem to improve the number of words in Theodore's stories. Phase B productivity levels were lower than in Phase A.

Otto

At the start of Phase B, Otto wrote one exceptionally long web story. This may have been motivated by the new writing strategy, a suggestion consistent with the jump in story length between the final web session and the first wheel session. Novelty may improve initial task performance in children with ADHD (Belfiore, Grskovic, Murphy & Zentall, 1996). Later in Phase B, Otto's performance declined and remained within the range in Phase A.

No upward trend was visible for number of words across this phase. Repeated lessons did not lead to increases in story length. Poor levels of fluency were noted in initial TOWL syntax and vocabulary subtests. He showed an above average contrived knowledge of syntax (with a standard score of 14), but when writing a story, his syntactic maturity score was below average, with a standard score of 6. A similar gap between knowledge (8) and applied skills (3) was seen in vocabulary scores. Otto's writing skills seemed to deteriorate when he had to juggle the demands of syntax, spelling, punctuation, and vocabulary with text-level higher order skills. This is consistent with storage difficulties as outlined by Swanson and Berninger (1996).

Otto wrote more propositions when using the web to plan, on average, exceeding the baseline range in the first, third and fourth sessions in Phase B. An early onset of gains suggests that web task materials helped Otto to generate more ideas. Syntax problems may not have reduced the number of propositions in stories,

since many ideas can be conveyed using few words. The spatial format could minimize the effort needed to generate ideas, prompting more ideas and reducing task demands associated with translation skills.

Web Gains - Theory and Principles

The first type of productivity gain was in *phase level*. The mean number of propositions and words was higher in Phase B than in Phase A for four students (Otto, Sebastian, Fred and Philbert). The web planning strategy may have helped to compensate for difficulties hindering higher order skills. If so, students would show rapid and sustained productivity gains, exceeding the Phase A range, from the onset of the phase. This effect was noticed in the stories by Philbert and Fred, and for Otto in propositions.

It had been expected that the web would lead to extra story ideas being generated during the planning stage, and these extra ideas would be written into draft stories. Yet there was no evidence that students actually thought of more ideas during the web planning stage than when planning orally. Philbert and Otto did write longer stories when they recorded more ideas in their web plans beforehand, suggesting that output during planning could help to improve story length for some students. This was not the case for Fred, Theodore and Sebastian. There was little association between the number of ideas recorded in these students' plans and productivity in the corresponding stories. Yet Fred and Sebastian made rapid gains using the web strategy. The effects of web plans seemed to extend beyond the planning stage. Four factors could be involved in the drafting stage. The web enabled the use of visible cues, minimal interference, spatial resources in working memory, and reduced effort.

The diagram provided visible cues to prompt recall of related ideas. This may have been assisted by the minimal interference between storage of ideas in the

visuospatial sketchpad, and processing of sentences in the phonological loop. The additional working memory resources may have made it easier to generate more ideas during the drafting stage. Fred was observed to write several sentences for each single idea listed in the web, and would look back to this plan when he was unable to think of any more ideas to write about.

Spatial outlines have been found to minimise the effort involved in storing networks of ideas (Robinson & Schraw, 1994). The web plan could prompt students to elaborate on sentences, as students could recognize relationships between the ideas recorded in their web plans while they wrote story drafts. These associations could provide a skeletal framework when drafting the story, helping to account for increases in story elements in some students' stories. If less effort was needed to generate ideas during the drafting subtask, students would increase the numbers of ideas and words per story. Increases could be jeopardized if effort was consumed by struggling with syntax or hand-writing. This would limit the number of words transcribed by students.

The second type of productivity gain was an *upward trend* across sessions. All students wrote more propositions in later Phase B sessions. All students, except Otto, wrote more words after practising the strategy. The task was held constant, so trends reflect practice effects. Task engagement should have increased as students became more familiar with the planning strategy and PW2R routine. However, the procedure did not appear difficult for any of the students other than Theodore. An alternative explanation may be that the web cued students to return to the drafting task.

Shifting attention from writing to reflection or back again may be affected by the momentary lapses in concentration symptomatic of ADHD (Jordan, 1992). A simple task methodology may become habitual, and faster, if repeated often enough (Schneider & Schiffrin, 1977, cited in Baddeley, 1997). The colourful web diagram could catch the eye automatically, while habit prompted students to glance back at the drafting task - thus reducing distractions and increasing time spent writing. More words and ideas could be written in later sessions, as students made more efficient

use of writing time. On-task behaviours were not timed, so this interpretation is speculative.

The final type of productivity gain occurred in Phase D. Fred maintained gains, suggesting that the web effects were not simply due to continued PW2R practice across Phases A and B. The longer web stories were repeated when alternating between this strategy and baseline in Phase D sessions. This suggests that the web planning strategy contributed to Fred's gains. However, transfer was not achieved. Improvements in written expression also depended on instruction, practice, and appropriate task materials, training students in the required genre and setting.

Wheel Effects on Productivity

There were three hypotheses regarding productivity when using the wheel strategy. The first hypothesis predicted that students would write more words and ideas in stories planned using the story grammar wheel rather than orally. This was supported by data from four of the five students. Fred, Philbert, Theodore and Otto wrote more words and ideas in Phase C than in Phase A. Contrary to the hypothesis, Sebastian wrote shorter stories when using the wheel rather than baseline, although stories were longer in the middle of Phase C.

The second hypothesis predicted that students would maintain the wheel strategy gains in Phase D but that these gains would decline when stories were planned orally. Philbert, Theodore and Sebastian alternated oral and wheel plans. All maintained gains when using the wheel strategy, but only Philbert continued to write fewer words and ideas in stories based on oral planning. Data from Theodore and Sebastian did not support the second hypothesis. They showed productivity gains when using the oral planning strategy rather than the story grammar wheel.

Finally, it was hypothesized that students would write equivalent or more words and ideas when using the relatively undemanding web planning strategy, compared to the story grammar wheel strategy. Data from Sebastian and Fred

supported the use of the web rather than the wheel task materials. At the onset of Phase C, story length dropped by over 50 words for Sebastian, and 70 words for Fred. Sebastian improved performance later in Phase C.

Contrary to the hypothesis, Philbert, Theodore and Otto wrote longer stories using the wheel strategy than the web. For these students, the story grammar seemed to reduce task constraints. This effect may depend upon the specific skill and knowledge deficits present in individual students. The story grammar task demands prerequisite skills such as vocabulary and verbal fluency, but otherwise appears to assist students by providing accessible discourse knowledge. Individual results will now be discussed.

Sebastian

Sebastian found the wheel more difficult than baseline, and baseline more difficult than the web. The spatial strategy advantages, shown in Phase B, did not extend to mean performance levels in Phase C. This may be due to the effort and concentration needed for learning story elements and writing about them. Number of words and propositions fell at the onset of Phase C, with a productivity level lower than that of Phase B. More propositions and words were written in web stories than in the wheel and baseline, and this was consistent with the original hypotheses.

For Sebastian, the wheel strategy may have increased demands on higher order writing skills. Sebastian had low scores in TOWL subtests for the higher order writing skills of Thematic Maturity (standard score of 5) and Contextual Vocabulary (standard score of 6). Thematic Maturity required plotting and sequencing ideas, while contextual vocabulary required use of known vocabulary while writing text. The story grammar wheel demanded that students structure a plot and search for specific words to apply the story element terms to the topic.

Sebastian scored poorly in reading comprehension and could not read fluently. This may have made reading and using the story grammar terms more difficult. This

effect was supported by observations during lessons. Sebastian's dictated web story was much longer than its counterpart wheel story. The web advantage over the wheel strategy was apparent even when transcription was not required.

A practice effect was noticed. Fluency gains were achieved by the end of Phase C and accelerated across Phase D. The progress when using the wheel strategy did not mean that it became relatively less demanding in comparison to the other planning strategies. In Phase D, Sebastian wrote longer baseline than wheel stories.

Fred

Fred wrote slightly more words in wheel stories than in baseline, on average. As expected, both forms of written planning were more useful than baseline. He wrote shorter stories when using the wheel strategy compared to the web. This was also consistent with the hypotheses. Practice did not improve story length in later sessions, according to the downward trend across Phase C. The wheel strategy demanded transcription and translation of story elements, reading skills, vocabulary and rapid idea-generation. Fred made better use of the wheel strategy under less demanding conditions. In the collaborative lessons starting each phase, he dictated a 118 word story using the wheel strategy, compared to 93 words when using the web to plan. Under these conditions, the teacher helped to generate story ideas and acted as wrote the plan for students.

When Fred planned and wrote test stories under time constraints, he produced fewer words and ideas using the wheel than the web strategy. The wheel planning task demanded more shifts in attention than the story grammar wheel. In the web planning stage, students could devote 5 minutes to one topic heading. In the story wheel plans, students had approximately 30 seconds to recall each heading and generate topic-related ideas for it. They needed two minutes to recall and quickly write the diagram, then had to rapidly shift attention from one heading to the next. Fred remained hesitant in recalling and writing these story grammar terms. Thus, he

frequently failed to generate ideas for all the story elements within the five minute limit, and found the wheel planning stage demanding. Verbal skill deficits may have prevented him from completing this stage quickly, adding to writing task constraints at the drafting stage.

Fred was a reticent child with a limited vocabulary. The TOWL contrived subtest assessed vocabulary knowledge as below average (6). His reading was not fluent, and he was unable to sound out unfamiliar words. His sight-word reading skill was 2 years behind his chronological age. Verbal fluency problems may contribute to difficulties in translating ideas into written words. McCutchen, Covill, Hoyne and Mildes (1994) argued that lack of fluency in lexical (word) retrieval could compromise the capacity to generate essay ideas.

The story grammar wheel demanded rapid word retrieval in planning, as it imposed extra vocabulary, reading, plotting and time constraints on generating ideas. This would have increased the demands on Fred and made the planning stage more difficult for this student. His language problems appear typical of students with ADHD *and* learning difficulties. Rapid naming, reading fluency and selective attention problems have been associated with learning disabilities; and effort and sustained attention problems have been linked to ADHD (Richards, Samuels, Turnure & Ysseldyke, 1990; Borcharding, et al., 1988).

Philbert

Philbert had already improved story length during the web phase, but further gains were evident in Phase C. These phase-level gains seemed to be associated with an almost mechanical application of the wheel strategy. There were no upward trends denoting practice effects on productivity later in the phase. The story grammar strategy had the advantage of reducing the task demands during the drafting stage. Philbert wrote slowly and may have benefited from the extra time and effort

available for writing sentences. In Phases A and B, plotting and organisation of ideas were done at the same time as sentences were drafted.

In Phase C, the plot and framework were completed during the 5-minute planning time-frame, reducing subsequent demands. Philbert could reproduce the diagram and plan story ideas within the time constraints. When he began drafting sentences, he had discourse knowledge on hand to help him, and had already done the work involved in plotting. Fewer constraints at this stage of the writing process could explain his productivity improvements. For this student, the story grammar terms may have supplemented the advantages of using a spatial plan. The wheel strategy may have improved access to discourse knowledge. Philbert had a low standard score for Thematic Maturity (7) and wrote few story elements in Phase A stories. A narrative framework reduced the effort needed to make decisions about how to link and organise ideas into a story, allowing more time to be spent on generating ideas, a higher order skill.

No upward trend in productivity was found across Phase C. Evidently, the task constraints on translation remained stable. Gradual reductions in effort would have improved story length in later sessions. Fluency would increase as the task became progressively less complex. The results suggest that Philbert did not improve his understanding of “higher order” aspects of the writing process. The phase-level gains appear to be due to the effects of task materials rather than practice, as his maintenance stories remained longer when using the story wheel than when planning orally.

Number of words did decline across Phase C. This may reflect waning interest due to the repetition needed in each session to reproduce the same story grammar wheel terms. Shroyer and Zentall (1986) found that repetition was associated with declining comprehension in students with ADHD. In the learning phase, the story grammar was generated in the lesson and then repeated immediately afterwards in the test story. The diagram was written only once in the wheel maintenance sessions,

repetition was reduced, and fluency gains were evident across Phase D^A, prompting speculation that he was beginning to transfer story structure knowledge to orally planned stories. Philbert may have been motivated to make this extra effort to reduce task demands when planning orally.

Variation of the task stimuli has been associated with accelerating fluency gains in *reading* skills (Samuels & Flor, 1997), but more research is needed to show mechanisms assisting fluency and transfer of written expression skills. Factors which may have helped Philbert to improve fluency in Phase D could include: the reduction to one story topic per session (making more effort available), the elimination of repetition within the same session (improving arousal), and the alternate use of planning strategies in this phase (varying the task and promoting transfer).

Theodore

Theodore wrote more words in Phase C than Phase A. Story length did not improve immediately, nor was the range much higher than in earlier phases. Productivity became more consistent across sessions, but data showed a stable maximum story length of 117 - 120 words from Phase B through to Phase D. This suggests that practice effects may have influenced Theodore's gains, rather than the spatial format of the task materials. This interpretation is consistent with the lower means in Phase B for the web and with the improvement in stories in Phase D^A. Gains in words and propositions could be linked to continued instruction and PW2R practice, with the oral planning strategies requiring less effort by the end of the teaching program.

Results from this student suggest that the effectiveness of oral planning was underestimated in formulating the thesis hypotheses. One advantage of the baseline strategy is that it requires less handwriting than web or wheel, and eliminates the need to re-write anything. Theodore had difficulty writing quickly and legibly. His

TOWL scores in Sentence-Combining (6) and Syntactic Maturity (6) also showed deficits in contrived syntax and applied syntax. Handwriting and written syntax may have continued to demand considerable effort, and written planning strategies may have failed to reduce these demands until the story grammar wheel was modified. The extra effort needed to control handwriting may have limited productivity gains. Lesson observations are consistent with this interpretation. In every phase, Theodore composed his longest stories when dictating the first story in the first lesson of the phase. No hand-written test story was as long as any of the three “model” stories, which were 130 words (baseline), 159 words (web) and 142 words (wheel) in length.

Theodore’s syntax did not improve during 14 writing sessions using the three different planning strategies. In retrospect, it was recognized that while a strategy could make it easier for students to perform well and improve skills through practice, it could not provide missing knowledge about written syntax. This difficulty was addressed through explicit instruction in syntax within the context of story writing. The story grammar wheel was retained and instruction was added to the *drafting* stage in Phase C². This approach to syntax instruction was consistent with the advice of Berninger and Stagel (1996) to integrate instruction in sentence and text-level skills within the one session.

In Phase C, mean productivity and story elements improved from earlier phase levels. Syntax and productivity gains occurred in Phase C². Effective tutoring strategies should deal with gaps in knowledge and guide accurate practice through structured task materials (Berninger, et al., 1997). Theodore’s final productivity gains could be linked to the instruction in syntax, PW2R practice (reducing demands over time), and to the genre knowledge contained in the story grammar wheel, rather than the spatial format used in Phase C task materials.

Otto

Otto wrote longer stories in Phase C than in Phases A or B. Story length (words) increased at the onset of Phase C and gains were consistent across the phase. There was overlap between Phases B and C, but this was due to an initial 132-word web story. The gains in number of words at the onset of Phase C may be linked to an improved access to and/or knowledge of story elements. With a clear understanding of what task expectations were, Otto could devote more time to writing words, and less to organising ideas and working out how to go about the task. The spatial design may have helped Otto memorize the story grammar terms. The addition of the PW2R routine to the wheel strategy directed effort to story structure before he had to begin writing sentences. Otto was able to complete the diagram and find story ideas within the 5 minutes allotted to planning. This cued knowledge for translation during the planning stage to plot the story, and freed effort for transcription and sentence construction during the drafting stage.

The level of propositions was higher in the web phase than in other phases. The mean number of propositions in Phase C declined from Phase B levels, as had been hypothesised. This may reflect story grammar demands on higher order skills, hindering translation of ideas. Demands would have declined as Otto became more familiar with the story elements. To deal with the new story grammar demands, one of Otto's initial coping mechanisms was to reduce the task to a question-and-answer session. This led to minimal elaboration of the plot and did not help to improve relevance ratings.

Wheel Gains - Theory & Principles.

Instruction, task design and practice explain gradual improvements across Phase C. But instruction and practice do not explain the rapid onset of phase gains, increasing performance levels compared to baseline. For all students, except

Sebastian, productivity increased at the onset of Phase C from baseline levels. This effect may be explained by the introduction of the new planning task. There were two aspects to planning task materials in Phase C. The first aspect was the spatial format, and the second was the task content - the addition of the story grammar.

The first type of productivity gain was in *phase level*. Mean productivity (number of words) was higher in Phase C than in Phase A for all students except Sebastian. The spatial outline may be one of the factors explaining this improvement over baseline. As in the web strategy, the written, spatial plan may have helped to reduce drafting task demands and led students to write longer stories. This is consistent with research findings about the minimal effort needed to access data from spatial outlines (Robinson & Schraw, 1994).

The addition of story elements may have helped to increase productivity during Phase C in students who experienced difficulties in retrieving such information, or who lacked discourse knowledge. For Theodore, Philbert and Otto, stories could be structured in the planning stage, reducing the effort of plotting while drafting sentences. These students could complete the plan during the allotted 5 minutes, reducing the number of tasks at the drafting stage. The effort could be directed into writing more words.

For Fred and Sebastian, the story grammar wheel seemed to demand more effort than the web strategy, as hypothesized. Their stories in Phase C were shorter than those written in Phase B. Specific difficulties may have affected wheel strategy use. Fred had poor reading fluency and vocabulary, and Sebastian had poor reading comprehension and reading fluency. These factors may have increased the time and effort needed to learn and use the wheel strategy. They took a number of sessions to memorize the story grammar terms. Whilst this was occurring, they needed more time to draw the diagram and less time was available to think of ideas. Their early wheel plans contained few ideas, adding more of the planning workload to the drafting stage. Later, Sebastian needed less time to draw the diagram and he eventually wrote a Phase C story exceeding the Phase B range.

This leads to the second type of productivity gains during Phase C:

improvements across the phase. Otto, Theodore and Sebastian improved story length (words) over the course of Phase C. Two factors contribute to increased handwriting fluency: clear and effortless recall of relevant knowledge, and learning from accurate practice in context (Berninger, et al., 1997). These factors may reflect learning processes which are also relevant to fluent story-writing. Consistent PW2R practice has been linked to story-writing fluency (Berninger, Abbott, Whitaker, Sylvester & Nolen, 1995) and mastery of story grammar knowledge has been associated with improved productivity (Montague & Leavell, 1994). Sebastian, Theodore, and Otto included more story elements in Phase C stories than in earlier phases. Theodore made further gains across Phase C². These three students seemed to gradually improve their productivity and their understanding of the writing process in Phase C. Their attention to story grammar, rather than their own ideas, may have led to a reduction in the level of propositions compared to Phase A for these students.

This response may be distinguished from rapid, immediate gains in productivity at the start of the phase. Fred and Philbert did not progressively improve number of words across sessions in Phase C, although Philbert made immediate gains at the start of Phase C. The application of story elements did not become easier over time for these students. Effort would not become available for increasing story length in later sessions.

In Phase D, Sebastian, Theodore and Philbert alternated use of the wheel strategy with orally planned stories. Philbert's productivity gains depended on his use of the wheel strategy, when the planning strategies were alternated. This difference was repeated across sessions, minimizing the likelihood of a chance outcome favouring one or other strategy. All three Phase D^A stories were shorter than all three Phase D^C stories. For Philbert, the story grammar wheel continued to be associated with longer stories than when he planned orally.

For Sebastian and Theodore, Phase C productivity levels were maintained or improved in Phase D^C, but orally planned stories were longer in Phase D^A. Gains

were not restricted to the written planning strategy. It is possible that an improved understanding of narrative frameworks and gradual gains in fluent lower order writing skills led to productivity gains in Phase D^A. The wheel strategy is likely to have contributed to writing gains for some students, even though final phase results did not show a reversion to baseline levels when using the oral planning strategies.

Maintenance results show clear differences in productivity between the two strategies, indicating that strategies did affect writing, but not always as anticipated. Several students made unexpected gains in the oral planning strategy when this was repeated in Phase D. This did not show a culmination of practice effects regardless of strategy, but an advantage for oral over written plans evidenced by longer stories in alternate sessions using the baseline strategy.

Wheel & Story Elements

It was hypothesised that stories would contain more story elements in Phase C than in Phase A. This was confirmed by data from all five students. Story element levels were higher for four students than in Phase B. Gains occurred at the onset of the phase. There were no upward trends, except for Theodore's data in Phase C. However, Theodore's story elements peaked in the modified wheel phase and upward trends did not occur in that phase. Overall results support the hypothesis that the wheel or modified wheel strategy led to improved application of story elements.

Sebastian

For Sebastian, mean number of story elements was at its highest during Phase C. Improvement occurred at the onset of the phase, linking gains to instruction and task design rather than practice. Performance was erratic and story elements declined in the final sessions in Phase C. This could have reflected end-of-term fatigue or the waning novelty of the wheel strategy.

Fred

On average, Fred wrote fewer story elements in Phase C. However, three wheel stories were within the 6 - 8 story element range, as in Phase B. Knowledge gains are not reversible, although heavy task demands may limit consistent application of that knowledge. Fred applied up to 8 story elements in wheel stories, but wrote only 2 on other occasions during this phase. These lapses and the downward trend in story elements suggest that effort and motivation can affect this variable. Very short stories (e.g., 20 words) cannot convey story elements to the reader. If story length drops to such levels, story elements may decline despite adequate discourse knowledge.

Fred seemed to learn a little about narrative structure in Phase C. He could reproduce the wheel diagram and find appropriate ideas when given extra planning time. This did not guarantee that this knowledge would be applied under demanding test or strategy conditions. At maintenance, his web stories included more story elements than web stories had in Phase B, but story element gains did not transfer to Phase D^A. For these orally planned stories, the story element mean was only 4.

Philbert

Story grammar was learned quickly by Philbert, but apparently not understood. Philbert could produce the diagram and write the wheel story, but the procedure seemed to have been memorized “parrot” fashion as a discrete set of rules for a specific task - “wheel” stories. The diagram was recalled rapidly, almost automatically. After the cues were written down, higher order skills were used in the translation of story elements to plots. Stories contained more story elements when he used the story grammar wheel rather than the baseline strategy. Oral plans did not prompt the use of the genre framework and story elements declined in Phase D^A.

A mechanical application of the diagram would not necessarily develop a deeper understanding of the narrative genre. Robinson and Schraw (1994) linked spatial outlines to specific consequences. For example, less effort is needed to remember data, but less elaborate processing is also thought to minimize long-term recall. In other words, the spatial format benefits short-term recall and storage in working memory, but will not automatically lead to better long-term understanding.

Philbert did improve story elements in Phase C and Phase D^C, compared to previous phases, and these elements were incorporated into plots in an appropriate way. This suggests that memorised cues (in an easily accessible format) may be useful as a starting point to improve “higher order” skills in students with ADHD and learning difficulties. In Philbert’s case, the diagram tactic was associated with improving story elements from a mean of 3 in Phase A, to a mean of 9 in Phase D^C. Stories began to include main characters who were motivated to solve problems. The difference that this made to the content of the narrative is evident when comparing examples of Philbert’s stories from Phase A and D^C (refer to Appendix H).

Theodore

Theodore wrote more story elements in Phase C, but took several sessions to learn the terms. The number of story elements increased with practice, over the duration of Phase C. Theodore demonstrated a progressively more fluent retrieval of genre knowledge when writing stories. Although Theodore took extra time to learn the terms at the outset, he seems to have built up an understanding of the required text structure rather than merely memorizing the terms. In Phase D, he used between 8 and 10 story elements per story, regardless of the planning strategy used in that session. As shown in Appendix H, his final story contained 10 well-integrated story elements.

Otto

Otto wrote more story elements from the onset of Phase C, suggesting that gains were associated with using the wheel planning strategy. He used the story element knowledge effectively, producing all 10 story elements in each story for the first four sessions. While the level of story elements improved, no practice effect was possible because of a ceiling effect. The results in the last 2 sessions suggest that Otto's performance declined as novelty waned. Conversations with this student indicated that he was improving his understanding of the genre framework. He related the story grammar to TV programs and said that he used the strategy for writing tasks at school.

Story Elements Interpretation

Story element scores measured whether students met the basic requirement of including a number of story elements related to the plot. Improved numbers of story elements were seen in all students in Phase C and for Theodore in Phase C². Story grammar was included in explicit instruction, modelling, the planning strategy, guided practice and tests. The results were consistent with the research literature.

When well-learned, genre outlines have been shown to increase the number of elements in written compositions and improve holistic quality measures (Martin & Manno, 1993; Montague & Leavell, 1994; Montague, Maddux & Dereshiwsky, 1990). Poor discourse knowledge is associated with a lower quality of writing (Kellogg, 1987, cited by McCutchen, Covill, Hoyne & Mildes, 1994; Wright & Rosenburg, 1993). Story elements are a critical part of discourse knowledge as they provide the framework needed to develop the diverse aspects of a story. To improve the number of story elements in their stories, students must increase existing knowledge, and obtain ready access to it. Phase C assisted in this process.

Increased Knowledge:

Students with writing difficulties have been found to have only a rudimentary discourse knowledge (Montague, Maddux, & Dereshiwsky, 1990; Martin & Manno, 1995; Thomas, Englert & Gregg, 1987). In this thesis, students were unable to name the elements in a story prior to learning the wheel diagram. Their limited discourse knowledge was demonstrated by Thematic Maturity scores below the mean in the initial TOWL assessments. In Phase A, Philbert and Fred wrote an average of three story elements per story. Otto, Fred and Philbert were unable to describe the different parts of a report. The low story element averages in baseline seem typical of this student population. Explicit instruction in genre frameworks was needed to supply relevant knowledge about writing. The difficulty was more than a retrieval and organisation problem.

Each of the participants in this thesis had difficulties with three categories of story elements. The “hero and wants” category required students to write about a delayed goal. Students were expected to recognise that the hero’s motivation must be sustained for the duration of the story and they had to devise a plot which delayed solving the hero’s problem. ADHD is associated with aversion to delay and lack of goal-directed behaviour (Barkley, 1997a). The students’ own experiences and behaviour patterns conflicted with this story element. Students frequently responded by omitting wants, or inventing wants which were forgotten later in the story as events overtook the plot. Another typical response was to make the hero into a group of nameless people, and changing the hero’s motivation into an impersonal “cause”. This eliminated the need to describe and remember a main character, recall and justify that character’s motives, and devise problems preventing immediate satisfaction of the character’s goal.

The second category which created confusion was “problem and plans”. The students found it difficult to understand the role of planning in problem-solving. Planning requires anticipation of a future goal and is inconsistent with the impulsivity characterising ADHD. All students tended to omit a logical planning

element from stories until late in Term 2. Finally, students found it difficult to differentiate “actions” from “events”. This required an understanding of locus of control in a fictional character. The students’ usual response was to inflate “events” and minimise “actions”. When the hero did act, results tended to be immediate. Over time, test stories showed increasing integration of the hero’s wants, plans and actions. Story elements became more numerous and complex in later sessions. Examples of this may be seen in Appendix H. Theodore’s Phase D story, “The White Tiger”, links the main character, wants, plans and actions.

Improved Access

Story element gains began at the onset of Phase C and scores were consistently higher than in previous phases for all students except Fred. This phase changed only the planning task (instruction and materials) to help students learn and apply story grammar. Students showed rapid gains, rather than gradual improvement across the phase, suggesting the planning strategy contributed to the improved story element levels more than did practice. Task materials may have utilised dual encoding, increasing access to relevant information from the onset of Phase C. The visuospatial sketchpad may help students store, memorize and retrieve the genre framework quickly. As the story grammar was memorized, the students did not need to waste time finding each element on a think-sheet, but had these available instantly “on call”. This may have saved time and effort in developing a narrative framework which, in turn, saved effort for productivity gains and cued more ideas.

Students’ story element results were encouraging, as all showed that they could learn story grammar, and use the elements in stories written under time constraints. Story grammar knowledge was applied independently, without visible materials stating the retrieval cues. The spatial format may have made it easier for some students to memorize and apply the framework in the short-term, but other factors must have promoted the development of expertise, transfer and generalisation.

Over time, students may come to understand and internalise the information needed for writing. Numerous story ideas may fit into one chunk (“plot overview”), reducing task complexity and demanding fewer working memory resources for translation. Flower and Hayes (1980) suggested that improved topic and discourse knowledge could reduce writing constraints. With continued use of the story grammar across Phase C, several students may have increased expertise.

This would not improve access to story elements when using the wheel strategy, as the task materials supplied ready access to that from the onset of Phase C. But it may reduce the effort needed for translation and plotting may become less demanding for some students. This could trade off into productivity gains later in the phase. Otto, Sebastian and Theodore wrote longer stories in later sessions. More genre knowledge stored in fewer chunks could reduce demands on working memory, improve productivity, and increase story elements when not using the wheel strategy.

Wheel & Relevance

It was hypothesised that students would write more relevant stories using the wheel strategy. Sebastian and Theodore improved mean relevance scores as well as increasing story elements in Phase C. Their baseline stories had been irrelevant or only partially relevant. Theodore wrote one completely relevant story in Phase A (over 3 sessions), two in Phase B (6 sessions), and six in Phase C (in 8 sessions). Clearly, relevance increased in Phase C. Sebastian wrote his first completely relevant story in Phase B, and then wrote four in Phase C. Phase C coincided with increased relevance for Sebastian, despite productivity difficulties. Philbert wrote his first three completely relevant stories during Phase B, then wrote two completely relevant stories in Phase C and four in Phase D. Mean relevance rose in Phases B and C, compared to A.

Individual skill in writing relevant stories remained constant across phases for two students. Fred usually wrote concise, relevant and occasionally humorous

stories, and drew on information about family, friends and an active lifestyle. These experiences were related to topic titles about holidays, treasure and outdoor adventures.

Otto's stories were usually about death or suicide. When the topic could not be made to fit these themes, stories became irrelevant. This is consistent with Barkley's (1997b) observations about ADHD and perseveration. Otto had developed a plot and applied it routinely whenever writing stories. Although wheel stories were longer and contained more story elements than web or baseline stories, Otto's relevance ratings did not improve. At maintenance, students did not seem to write more relevant stories using one or other strategy. All four students wrote completely relevant stories more frequently in Phase D, regardless of strategy.

Relevance Interpretation

Strategy differences were not apparent in Phase D. Improved relevance coincided with improved story grammar for Sebastian and improved number of words for Theodore and Philbert. These results can be understood in the light of McCutchen's (1986) findings that cohesiveness, length and discourse knowledge are independent, but related variables. Cohesiveness depends upon relevance between sentences, and between sentences and the topic. A framework put into place using a written planning strategy, would lead to a relationship between sentences building that framework. In this thesis, once improvements in relevance had begun, they persisted into the next phase. This implicates cross-phase variables in the maintenance of relevance gains. Factors which may have assisted in this include feedback on reader response, accumulation of storylines and vocabulary feedback across phases.

Improved topic knowledge has been associated with relevance. Researchers found that topic knowledge was linked to relevant details in baseball stories by Grade 9 students (Benton, Sharp, Corkill, Downey, & Khramtsova, 1995).

McCutchen (1986) found a positive correlation between coherence and topic knowledge. Students use their general knowledge and experiences to write relevant stories. The participants in this thesis based a number of stories on family holidays and leisure activities. Later, students also wrote several stories about imaginary characters who were teased, bullied, or different from their friends.

Topic knowledge and experience may include students' own previously written stories. This is consistent with Montague and Leavell's (1994, p. 30) observations that students developed "stock characters" after instruction and practice in story-writing. In this thesis, Sebastian, Theodore and Philbert recycled characters and plots, despite lengthy periods of time having elapsed between old and new compositions. For example, the banana slugs reappeared over 15 weeks later in Philbert's Phase D story about Treasure Island. Sebastian regularly duplicated storylines about treasure hunts, disappearing dogs and visiting relatives. These students built a bank of story ideas, and would use compatible items for new story topics. This contributed to greater relevance in stories.

Confounding Variables

All students improved dependent variables in stories in Phase D, compared to Phase A. As spatial plans were not used, other factors must have promoted gains in orally planned stories at maintenance. Phase gains did not occur in isolation of other factors. The teaching program included a one-to-one setting, explicit instruction in the writing process, guided and independent practice and immediate lesson feedback on spelling, vocabulary and writing strategy, as well as positive feedback about at least one aspect of the lesson. These teaching variables could be considered prerequisites for strategy gains, and are confounding variables. In addition to teaching variables, specific skill and knowledge deficits affected students' responses to the strategies. These factors should also be considered as confounding variables.

Feedback

Prompts, practice and feedback were necessary for students to learn to use each strategy. Prompts were graduated, from least to most specific questions. Feedback was predictably structured, immediate, and related to individual stories. These methods are recommended for students with LD (Case, Mamlin, Harris & Graham, 1995; Deshler & Schumaker, 1986). The feedback showing “reader reaction” may have helped to improve relevance in students’ stories. Relevance ratings in Phase D tended not to be linked to one or other planning strategy.

Instruction and feedback after a lesson seemed to increase the length of the student’s story in the test which followed. However, the within-session effects of lesson feedback were not necessarily consistent with phase gains. In Phase B, on average, Sebastian wrote more words in the lesson prior to each test. No immediate gain occurred in story length within the same session, but mean story length improved more in Phase B than in the other learning phases. This may be because feedback was not issued on the quantity written, to minimize the likelihood that feedback would be responsible for story length gains (as the thesis sought to show the effects of the planning strategy variable). Feedback may have affected content to a greater extent than story length, e.g., improving vocabulary and the writer’s awareness of the reader.

Some discrepancies between within-session and phase gains could be explained by the effort needed to learn the story grammar. In Phase C, only, Otto wrote more words in lessons than in tests. However, his peak productivity gains occurred in this phase. Lesson stories reached a maximum length of 154 words. Otto may have exhausted effort in the story grammar lessons, responding to lesson prompts, but writing fewer words in the test which followed. Theodore made his greatest within-session gains after lessons in Phase A. This was at odds with his highest mean productivity levels in Phase C and C². Theodore may have put a substantial effort into learning the story grammar, leaving less effort for tests.

Motivation

Motivational factors may have influenced trends across a phase. All students were praised as part of lesson feedback. While this could motivate effort in tests, praise was consistent in all sessions and would not explain differences between phases. Erratic performance within a phase suggests fluctuations in motivation and executive control, and would be affected by factors which tire, distract or stimulate the student, e.g., novelty may increase initial effort and story length. Variability in performance is characteristic of children with ADHD (Fowler, 1992). Downward trends may be due to declining motivation or increasing effects of disinhibition. Waning novelty and repetition have been associated with poor performance in students with ADHD. This may be more noticeable in complex tasks, as students lose the capacity to monitor performance. This could influence the final sessions in a phase. All students may show more fatigue later in the school term. For example, Theodore wrote shorter stories at the end of term in early Phase B sessions.

Practice & PW2R

All students improved story length in orally planned stories, writing more words in Phase D than in Phase A. This effect varied between individuals. All students showed improved productivity across sessions within at least one phase. Improvements over time show practice effects - that is, productivity gains as sessions were repeated. There were two factors involved in practice gains. One was the PW2R approach. The other was the model/test or lead/test sequence, giving students the opportunity for guided and independent practice in each session. The model/lead/test sequence is effective and well-established as a general remedial teaching strategy.

The PW2R routine breaks the task into components, each with fewer task constraints. The teacher can isolate and immediately correct specific skills, such as

idea generation, plot organisation, or transcription skills. These skills may be more amenable to development when competing task constraints have been reduced, as the student can focus effort on the deficits. Gaps can be addressed within the writing task context. While Flower and Hayes (1980) suggest that discrete stages are unnecessary, their model reflects expert processes. They assume that the writer is able to monitor and self-evaluate. Students with ADHD and learning difficulties may need help to clarify each writing subtask and practise them in a set order before they are able to direct the whole process themselves.

An upward productivity trend was found from first to final session in Phase B. Web results obtained from all five students in this thesis are consistent with the study by Berninger, Abbott, Whitaker, Sylvester and Nolen (1995). These researchers found gains in writing fluency, story length and number of story elements were associated with the PW2R approach used to teach third graders with writing difficulties. Hallenbeck (1996) used a sequenced planning, drafting and revising routine which increased composition lengths, although he did not use 5 minute stages and did not record the effects on fluency. Albertson and Billingsley (1997) also found that teaching students to plan and review led to increases in story elements and length. Rate of production did not increase, but these researchers did not time writing during lessons. Timing was not an explicit goal, as it is in PW2R.

Practice alone does not explain the thesis results. Each student showed a phase-level improvement specific to web or wheel task materials. This improvement was replicated over a number of sessions within that phase. These results are not consistent with a progressive improvement due to practice alone. This is indicated by the following story length (words) data:

- declining baseline results after web gains in Phase D for Fred,
- declining baseline results after wheel gains in Phase D for Philbert,
- reversal of baseline gains at onset of web for Theodore,
- reversal of web gains at onset of wheel for Sebastian,

- absence of practice effects in Phases A and B for Otto, contrasting with practice effects in Phase C, and
- reversal of web propositions in Phase C for Otto.

Fred's web results justify his use of this strategy as an alternative to think-aloud planning in the PW2R process. Other students' gains in story elements justify the use of the wheel as another planning alternative for students who lack story grammar knowledge. The web or wheel task materials were linked to distinct effects on phase level, regardless of whether or not upward trends occurred. Practice effects interacted with strategy use.

Language Skills

Specific skills and knowledge varied between individual participants and these factors may have confounded responses to the strategies. In Phase D, Sebastian and Theodore did not replicate the Phase C advantage over baseline, failing to demonstrate a link between the intervention and the gains in dependent variables. However, Sebastian and Theodore may have transferred gains in skills/knowledge from Phase C to the baseline strategy in Phase D.

Some improvement in baseline had been expected in all students, after two terms of writing tuition and practice, but this was not expected to alter the relative advantages of written over oral planning strategies. Surprisingly, Theodore and Sebastian increased story length in orally planned stories beyond Phase C productivity gains. This did not reflect the culmination of practice effects, as productivity dipped and rose as the two strategies were alternated. An improved response to the baseline strategy may be due to improved genre knowledge, with more data stored in fewer chunks. It could be accessed in an economical way, without the need for visual cues.

Oral planning removes the effort of handwriting prior to the drafting subtask, reducing overall transcription constraints. Time saved on hand-writing could be used

for generating ideas at the planning stage. Internalisation of story element knowledge (learned in Phase C) could have reduced translation constraints. If students transferred gains to the oral planning strategy, a reduction in the translation constraints for that task could have confounded the results in Phase D.

Fred and Philbert continued to write longer stories using the written planning strategy, not the oral plans, replicating the earlier learning phase differences. Story element gains from Phase C did not transfer to baseline in Phase D.

It seems that the research hypotheses should be refined. Students need not continue to rely on the wheel strategy to reduce demands on working memory if improved skill and knowledge reduce task constraints. If written language skills were re-assessed, improvement would be expected for Otto, Sebastian and Theodore, while Philbert's and Fred's skills would be unchanged. For these two students, gains would remain linked to use of the wheel or web strategy.

Syntax

Theodore's writing difficulties were not resolved by practising PW2R or written planning strategies. The content of a complete sentence was lost whenever the reader could not decipher the syntax. Productivity was also affected. The revision stage was intended to be used to add more information. Theodore was wasting valuable revision time erasing and rearranging words, without any obvious rationale for the changes (other than to "look busy"). On occasion, the revised sentences were more difficult to understand than the original drafts. Phase C² was introduced to help Theodore write correct sentences. Surprisingly quickly, over just three sessions, Theodore's sentence composition became faster and more accurate.

By the end of Phase D, stories contained fewer syntactic errors and more story elements, compared to Phase A stories. Average story length and relevance had also increased by Phase D. Theodore said that he found it easier to write stories after Phase C², although he disliked the modified strategy.

Implications for Further Research

Baseline

Phase differences could have been better highlighted had baseline been longer. However, prolonged instruction could have drained motivation and was not appropriate for this thesis. Future research could evaluate the PW2R approach over a full term, by alternating it with one written planning strategy. If alternated, discourse knowledge should be learned prior to commencing the program, to ensure that students begin both strategies with comparable expertise. Discourse knowledge could be added to feedback in all sessions.

Recording Behavioural Variables

Anecdotal notes were made during sessions, but tape or video recording would provide a more complete record. This could detect environmental factors affecting progress. However, students may be more self-conscious when being taped and this may bias results. It would be useful to record specific behaviours in future research. Measures of active writing time and frequency of looking away from the composition could help to interpret the reasons for gains across a phase.

Medication

At the start of the program, parents understood that consistency in medication was necessary for research purposes and they agreed to advise the teacher of any changes in medication prior to sessions. Four children had an established daily routine for medication. Otto did not take medication. These arrangements remained in place for the two terms. Future research could explore whether writing is affected

by the onset or withdrawal times for the medication, and whether there are associations between medication and responses to teaching strategies.

Variation of Stimulus

Only one task stimulus was used: the topic title. This was chosen because it was commonly required at school - especially in tests. To evaluate differences between planning strategies, the task had to be kept constant in this thesis. While this may have assisted students to acquire skills on the trained task, further research is needed on how to promote transfer of gains. Story enders and pictures could vary the writing stimulus, or researchers could alternate the use of strategy, genre or setting.

Mid-week Data Samples

Four students did not complete homework and none had their homework supervised. This may have been prevented by giving parents and/or class teachers a checklist, a tactic which could have been regarded as intrusive by volunteer families. There is little evidence to show how homework benefits written expression skills. Information is needed about the effects of reinforcing children for completing their homework and whether this would improve the speed of acquisition, maintenance and transfer of gains in written expression skills.

Reliability

Content variables were more subjective than word tallies. Subjectivity was minimized by calculating inter-rater reliability and monitoring dependent variables across sessions. The repeated sessions duplicated strategy effects, improving reliability. Specific assessment procedures were outlined in Chapter Three.

Each student performed erratically in at least one phase, suggesting fluctuations in arousal or motivation for different individuals under certain task conditions. The strategies were not supplemented with additional motivational techniques as it would have been difficult to isolate the effects of the planning strategies and these students were volunteers. Implementation of these strategies in a classroom without positive motivational strategies is not recommended.

Teaching Implications

Task demands had an impact on written expression. This is relevant to lesson materials and assessments. For example, Fred's worst web stories exceeded 90 words. When using other strategies, he wrote as few as 20 words. This is the difference between a passing grade and grade retention. The strategy-related gap occurred repeatedly, despite the fact that the teaching environment, the task stimulus and the required written product were virtually identical across phases. The difference was in how Fred was expected to go about the very same writing task.

PW2R stages and an appropriate planning method may have improved dependent variables because these strategies helped to: disperse task constraints and organize the writing process, increase discourse knowledge, improve task-related knowledge and access that knowledge when story-writing. The teaching method was cost-effective. Despite variations in ability, symptoms and skill deficits within the group, all students improved writing performance in less than 20 hours of individual tuition, consisting of a 35 - 45 minute session each week. Productivity or story element gains occurred within two or three sessions for one or both interventions.

Teaching students to use written plans may help them to circumvent some effects of working memory problems. At the same time, teachers may promote fluent story production through the PW2R focus on transcription, translation and the integration of the two sets of skills. This addresses higher order skills in the planning stage and transcription while drafting, while the reviewing stage gives time to focus

the “rhetorical problem” and integrate higher and lower order writing skills. Here, students responded rapidly to the story grammar task materials within a spatial format. But there are other ways to achieve similar ends. Simple routines minimize effort and instruction can improve expertise, leading to fewer demands on working memory as students “chunk” more of the information necessary for the writing task.

Contrary to assumptions underlying the original hypotheses, no one approach will automatically reduce task demands, as the working memory difficulties and writing task constraints vary for different students. For example, Philbert wrote his longest stories when using the wheel strategy. Fred found that strategy difficult and wrote his longest stories using the web strategy. Teachers can adapt strategies to take a number of factors into account, as shown in Figure 17.

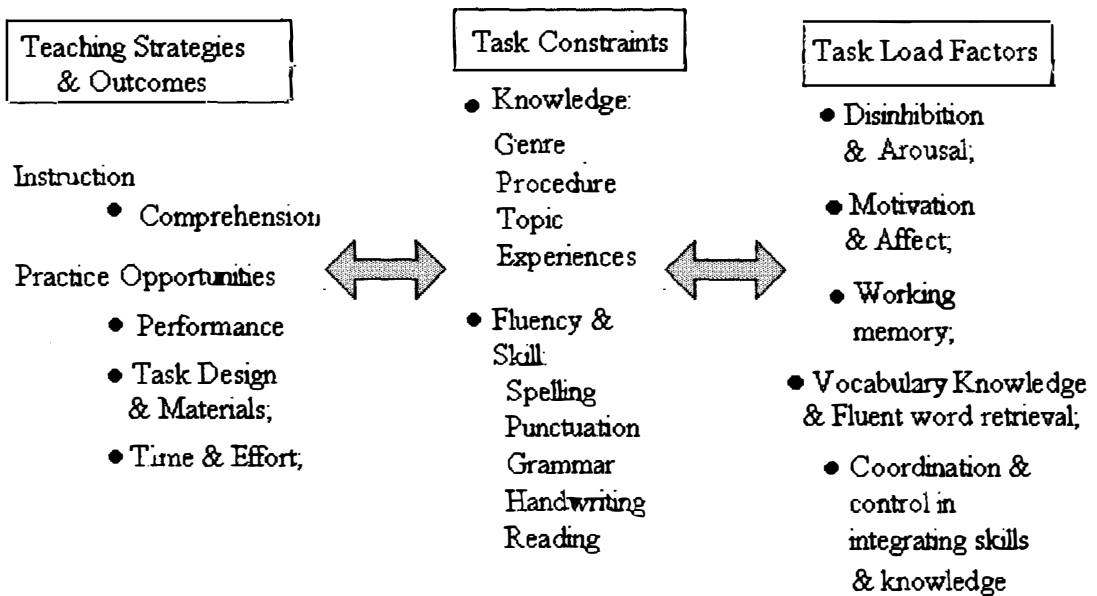


Figure 17. Overview of factors affecting teaching of written expression

Working memory is only one of the factors which may affect written expression. The writing task is more demanding if students have poor vocabulary or handwriting, or if they lack syntax or genre knowledge. To find an appropriate strategy for individual students, tutors need to assess specific language difficulties and evaluate responses to different strategies. In this thesis, the planning stage in the writing process was manipulated to reduce effort associated with task load factors.

Higher order writing skills need not be taught separately from the composition task as written expression requires the integration of a range of knowledge and skills. However, task constraints are distributed across the writing process. A tutor can balance these constraints by dividing the writing process into stages and teaching students to use an effective planning strategy. In this thesis, the teaching strategy included brief, salient, useful cues and spatial formats for instruction and practice.

Conclusion

When the planning strategy was varied, the number of story elements, words and ideas changed. Appropriate planning strategies were linked to rapid gains in fluency and story elements. Gains evaporated when inappropriate, highly demanding writing strategies were re-introduced. The appropriate strategy varied for different individuals and seemed affected by each students' specific knowledge and skills. These results were consistent with Graham's (1990) theory about a trade-off in effort affecting writing processes, and with findings by Swanson and Berninger (1996) that working memory is associated with higher order writing skills. Teaching practices did not correct capacity limitations, but structured the writing task so less effort was necessary while students learned to manage or overcome writing difficulties. Gains may be summarized as follows:

The PW2R approach and accurate practice could have contributed to the increases in number of words and propositions which occurred between the first and final baseline sessions. Fluency gains were consistent with the gains found by Berninger, Abbott, Whitaker, Sylvester, and Nolen (1995) when using the PW2R approach to teach primary school students with writing difficulties. The routine disperses writing task demands. Thereafter, timed practice may help to improve the rate of production. With accurate practice and feedback over two terms, some students appeared to accumulate a bank of story ideas or topic knowledge which improved relevance in later sessions, regardless of strategy.

In addition to these effects, changes in planning strategy influenced students' compositions. For four students, the *web* strategy was associated with an increased numbers of words and ideas compared to baseline. For one student, fluency declined while he was learning the new procedure, but productivity improved later in the phase. Fluency gains are consistent with gains reported by Hallenbeck (1996), although the present study controlled other variables during this phase. Gains may be attributed to the spatial format improving working memory resources and reducing effort during the planning and drafting stages. The strategy appeared to help some students to include more ideas in their stories.

The *wheel* strategy coincided with increased numbers of story elements, compared to oral planning. Three students also wrote more words when using this strategy, suggesting that the spatial format may help some students to learn and use genre frameworks. Gains in words and story elements are consistent with findings by Zipprich (1995) and Sinatra (1986, cited by Gleason, 1995) for compositions utilizing a pre-structured, spatial format in planning. The gains are also consistent with research requiring students to memorize and practise story grammar (Montague & Leavell, 1994) when writing stories.

ADHD and written expression difficulties should not prevent students from fulfilling their academic potential. Otto volunteered the extra time and effort to improve his writing, yet he followed in the footsteps of Tom and Jack before him, and left the school system without credentials. Teachers could contribute to breaking this cycle by improving students' writing skills, using appropriate tasks aimed at improving productivity and minimizing constraints on working memory. Tutoring strategies can help to remediate written expression difficulties by providing manageable, low-effort writing procedures (such as PW2R and the *web* strategy), explicit and accessible knowledge (such as story grammar or syntax), guided and independent practice (model/lead/test routines), structured feedback, and one-to-one instruction based on an ongoing assessment of individual needs.

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Appendix A: DSM IV (1994) Criteria for ADHD

DSM IV (Diagnostic & Statistical Manual)
ATTENTION DEFICIT HYPERACTIVITY
DISORDER Diagnostic Criteria:

A. EITHER (1) OR (2)

(1) Six (or more) of the following symptoms of inattention have persisted for at least six months to a degree that is maladaptive and inconsistent with developmental level.

INATTENTION

- (A) Often fails to give close attention to details or makes careless mistakes in schoolwork, work or other activities.
- (B) Often has difficulty sustaining attention in tasks or play activities.
- (C) Often does not seem to listen when spoken to directly.
- (D) Often does not seem to follow through on instructions and fails to finish schoolwork, chores or duties in the workplace (not due to oppositional behaviour or failure to understand instructions).
- (E) Often has difficulty organising tasks and activities.
- (F) Often avoids, dislikes or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework).
- (G) Often loses things necessary to tasks or activities (eg. toys, school assignments, pencils, books, or tools).
- (H) Is often distracted by extraneous stimuli.
- (I) Is often forgetful in daily activities.

(2) Six, or more, of the following symptoms of hyperactivity-impulsivity have persisted for at least six months to a degree that is maladaptive and inconsistent with developmental level.

HYPERACTIVITY

- (B) Often fidgets with hands or feet, or squirms in seat.
- (C) Often leaves seat in classroom or other situation where it is inappropriate (In adolescents or adults, this may be limited to subjective feelings of restlessness).
- (D) Often has difficulty playing or engaging in leisure activities quietly.
- (E) Is often 'on the go' or often acts as if 'driven by a motor'.
- (F) Often talks excessively.

IMPULSIVITY

- (G) Often blurts out answers before questions have been completed.
- (H) Often has difficulty awaiting turn.
- (I) Often interrupts or intrudes on others (eg. butts into conversations or games)

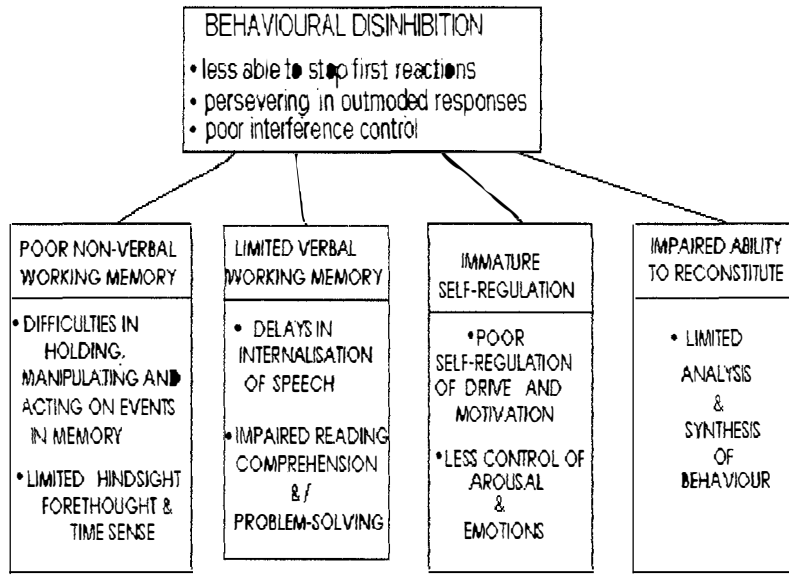
B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before the age of 7 years.

C. Some impairment from the symptoms is present in two or more settings (eg at school (or work) and at home).

D. There must be clear evidence of clinically significant impairment in social, academic or occupational functioning.

E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder, and are not better accounted for by another mental disorder (eg. Mood disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Appendix B: Barkley's Disinhibition Model (simplified)



(adapted from Barkley, 1997a, p.274)

These executive functions govern behaviour.

- *Nonverbal working memory* holds information in mind in order to control a response – “remembering so as to do.”
- *Verbal working memory* is inner speech.
- *Self-regulation* “elicits and modulate affective and emotional states.” This sustains goal-directed behaviour.
- *Reconstitution* capacity is used to analyse mentally represented information and enables learning of new behaviours.
- *Disinhibition* interrupts and interferes with these functions, and with coordination between them. Executive processes have less control of behaviour.

(Barkley, 1997a)

Appendix C: Propositions

(i) Textbook Procedures

Definition: A proposition is the “smallest unit of knowledge that can stand as a separate assertion.” (Anderson, 1995 p. 221)

Method: All information must be reduced to a series of simple sentences. In the examples below, words are grouped as subject and object, subject and adjective, or object and adjective.

Example: “Lincoln, who was president during a bitter war, freed the slaves.

Propositions: Lincoln was president during a war. The war was bitter. Lincoln freed the slaves.

Example: “The ants ate the sweet jelly which was on the table.

Propositions: The ants ate the jelly. The jelly was sweet.
The jelly was on the table.

Example: “The doctor who hated the lawyer liked the captain.

Propositions: The doctor hated the lawyer. The doctor liked the captain.”

(Anderson, 1995, pp. 222-223)

(ii) Work Sample: Scoring Propositions

STORY 3 TOPIC: THE ADVENTURES OF A BANANA SLUG.

(no title)

One day there was a banana slug from queensland who got shiped to the amundesen-scott south pole station in a box of bananas but he cralled into someones pocket and got shiped back to queensland. the next week he finds himself in another crate and not feeling to good in the stomach. Then he realises he is floating upside down and he can see a really big blue, white and green ball in front of him. He was on the space shuttle lukly the crew didnt find him.

88 words

24 PROPOSITIONS

One day there was a slug. This was a banana slug.
 It was from Queensland. It was shipped to the south pole.
 This was to the AS station. It was in a box.
 The box had bananas in it. He crawled into a pocket.
 He got shipped back to Queensland. It was the next week.
 He found himself in a crate. It was another crate.
 He did not feel well. His stomach was ill.
 Then he realised he is floating. This is upside down.
 He can see a ball. It is a big blue ball.
 It is also green. It is also white.
 It is in front of him. He was on the space shuttle.
 The crew didn't find him. This was lucky.

Appendix D: Sample Correspondence

Letter to Primary Schools

Dear Teacher,

I am a teacher studying the B. Ed. Hons. (one year conversion) course at Edith Cowan University, Churchlands. I am specializing in special needs education and am currently researching methods of teaching writing to children with learning difficulties. I am seeking the assistance of several local primary school teachers willing to permit their Grade 7 classes to complete a survey for me. The survey lists a number of story topics and asks students to rate these topics according to interest and perceived difficulty. The exercise should take 10 to 20 minutes. I can collect the results, and would be happy to help supervise the survey. Please ring me on 9401 0092 if you would be willing to help. Thanks.

Yours sincerely,

Letter to Parents

CONFIDENTIAL

Dear Parent,

I am a teacher studying the B. Ed. Hons. (one year conversion) course at Edith Cowan University, Churchlands. I am studying special needs education and am currently researching the effectiveness of three methods of teaching writing to students with written language learning difficulties and co-morbid AD/HD.

Your child is eligible to participate in this research, which entails a half hour tutoring program once every week for 20 weeks. Students will be taught different strategies aimed at improving their written expression. Data about learning progress and test results will be used for research purposes, although each individual student will remain completely anonymous.

Your participation in the teaching program would be welcomed.

Yours sincerely

Parent Consent Advice

DATE: _____

I, _____, of _____
_____ consent to my child
_____ participating in this study. We may
withdraw from the study at any time. Information about
learning progress and test results will be used for
research purposes, but individual children will not be
identified. This form will be retained for personal records
and will not constitute part of the dissertation.

Appendix E: Sample lesson sheets

SESSION TWO : BASELINE LESSON TOPIC

THE TICKLISH FISH

1. Planning (5 minutes)

Or, in other words _____ (:rephrase title)

Think about the topic.

Discuss ideas.

Don't write ideas or make a written plan.

2. Writing (5 minutes)_____

(NOTE: The actual lesson sheets included a full page of lined paper before the final heading : "review")

3. Review & Revise :

Read what you have written - correct spelling, change meaning, add more information.

Read what you have written - correct spelling, change meaning, add more information.

1. planning (5 mins)

Write down the topic in the middle of the page. Circle it.
 Draw the wheel around it with the 6 headings.
 Write ideas to go with the story topic headings. Ideas should branch off the wheel headings.

2. WRITING (5 mins)

[illegible]

Read what you have written - correct spelling, change meaning, add more information.

Appendix F: Individual Results

Sebastian

	Words	Propositions	Story Elements	Relevance
PHASE A				
Lost in the Computer	102	23	8	2
Cosmic Zoo	86	16	6	1
Adventures of a Banana Slug	120	28	7	1
PHASE B				
The Great Race	97	23	6	2
The Mysterious Man Next	108	27	7	1
Legend of the Dragon	127	30	7	1
The Ghost's Revenge	132	36	8	1
The Shrinking Room	122	31	7	2
Alien Shores	111	28	8	3
PHASE C				
Halloween Night	50	14	8	3
The Unexpected	94	23	9	3
Witches	78	20	5	1
Danger on Shore	103	26	9	1
Trail Bike	140	31	10	3
Only the Stars to Guide Us	89	20	8	1
The Big Bubble	97	23	7	3
PHASE D				
Baseline	158	39	9	3
Wheel	151	44	6	1
Wheel	149	42	8	3
Baseline	207	48	6	2

Fred

	Words	Propositions	Story Elements.	Relevance
PHASE A				
Lost in the Computer	68	18	4	3
Cosmic Zoo	37	8	2	3
The Adventures of a Banana	25	6	1	3
The Great Race	82	18	5	3
Transfer Setting: Classroom	80	-		
PHASE B				
The Mysterious Man Next Door	98	22	6	2
Legend of the Dragon	95	20	6	3
The Ghost's Revenge	122	31	8	3
Buried Treasure	137	36	7	3
Alien Shores	122	34	6	3
Transfer Setting: Classroom	65			
Transfer Task : Report	53			
PHASE C				
Trail Bike	65	19	7	3
The Unexpected	99	24	6	3
Witches	26	9	2	3
Danger On Shore	75	14	5	2
Only The Stars To Guide Us	20	3	2	1
Treasure Island	64	14	8	2
Transfer Task :Report	68			
PHASE D				
Baseline	19	3	1	3
Web	94	15	6	3
Baseline	91	22	6	2
Baseline	96	20	5	3
Web	131	25	8	3
Web	102	16	8	3

Philbert

	Words	Propositions	Story Elements	Relevance.
PHASE A				
Lost in the Computer	92	28	3	1
Cosmic Zoo	56	28	2	1
The Adventures of a Banana	88	26	4	2
PHASE B				
The Great Race	88	18	5	2
The Mysterious Man Next Door	142	39	8	3
Legend of the Dragon	91	22	4	1
The Ghost's Revenge	115	29	9	3
Buried Treasure	112	35	6	1
Alien Shores	113	34	5	3
Transfer Setting: Reading Clinic	101			
PHASE C				
Ali Baba and the Forty Surfers	154	34	10	3
Halloween Night	160	49	8	1
The Unexpected	138	37	9	2
Witches	131	36	7	1
Danger on Shore	125	35	7	2
Trail Bike	137	38	9	3
The Big Bubble	123	35	7	2
Transfer Task: Report	83			
PHASE D				
Baseline	100	22	6	3
Wheel	177	37	10	3
Wheel	154	31	9	1
Baseline	137	29	4	3
Wheel	147	36	9	3
Baseline	131	37	6	2

Theodore

	Words	Prop's	Story Elements	Relev.	Syntax Errors
PHASE A					
Lost in the Computer	73	20	6	3	4
Cosmic Zoo	83	20	7	1	4
The Adventures of a Banana Slug	112	24	7	2	3
PHASE B					
Great Race	65	14	2	2	3
Desert Adventure	41	10	3	1	2
Legend of the Dragon	98	22	6	3	3
The Ghost's Revenge	89	20	6	2	3
Buried Treasure	117	30	7	1	4
Alien Shores	65	14	7	3	2
PHASE C					
Ali Baba & the Forty Surfers	114	28	9	3	5
Halloween Night	71	12	6	1	1
The Unexpected	96	23	6	1	3
Witches	108	23	9	3	6
Trail Bike	79	18	9	3	4
PHASE C2					
The Big Bubble	119	19	10	3	1
Danger On Shore	86	18	10	3	1
Time Machine	97	15	7	3	1
PHASE D					
Baseline	119	29	8	1	6
Wheel	115	25	9	3	1
Wheel	84	19	8	2	1
Baseline	106	27	10	3	1

Otto

	Words	Propositions	Story Elements	Relevance
PHASE A				
Lost in the Computer	102	27	5	2
Cosmic Zoo	114	29	8	3
Adventures of a Banana Slug	88	22	5	1
The Great Race	105	30	7	3
The Mysterious Man Next	107	25	4	1
PHASE B				
Legend of the Dragon	132	31	7	2
The Ghost's Revenge	94	19	6	2
Alien Shores	90	34	2	1
Buried Treasure	108	30	8	1
Halloween Night	99	23	8	1
PHASE C				
The Unexpected	108	26	9	1
Witches	118	33	9	3
Danger on Shore	96	21	9	1
Trail Bike	117	28	9	3
Only the Stars to Guide Us	122	22	8	2
The Big Bubble	119	28	5	1

Appendix G: Survey Results

Topic Pool for Homework, Lessons & Tests

70 Topics Rated as Not Very Interesting, Not Difficult & Not Boring

TOPIC	% of all surveyed students rating this topic as (2) not boring (3) OK/not very interesting(3)
-------	---

1.Blast Off	38% - 2
2.Creepy Footsteps	31% - 2
3.Dreams For Sale	49% - 2
4.Flood	32% - 2
5.Freedom at Last	50% - 2
6.Help. I'm Sinking in Quicksand	33 % - 2
7.Home Run	42% - 2
8.Homework Machine	28% - 2
9.How The Turtle Got His Shell	44% - 2
10.Journey's End	39% - 2
11.Lost in The Fog	39% - 2
12.Magic Sword	46% - 2
13. My Best Friend	44% - 2
14.My First Parachute Jump	27% - 2
15.My Most Exciting Holiday	45% - 2
16.My Rocket Ship	35% - 2
17.Op Shop Ghost	50% - 2
18.Sounds on A Black Night	38% - 2
19.Sea Creatures	32 %- 2
20.Superdog	30% - 2
21.The Magic Fruit Salad	44% - 2
22.The Bashful Skunk	40% - 2
23.The Great Race	36% - 2
24.The Raft	41% - 2
25.The Shrinking Room	31% - 2
26.The Ticklish Fish	39% - 2
27.The Video Game	33% - 2
28.The Vet	52% - 2
29.The Winner	40% - 2
30.Tree House	35% - 2
31.Up, Up And Away	41% - 2
32.Wild, Wild West	45% - 2
33.Witches	38% - 2
34.Adventures of A Banana Slug	28% - 3
35.Adrift At Sea	46% - 3
36.Ali Baba and the 40 Surfers	33% - 3
37.Alien Shores	29% - 3
38.Buried Treasure	34% - 3
39.Becoming Invisible	31% - 3
40.Cosmic Zoo	33% - 3
41.Danger On Shore	33% - 3
42.Desert Adventure	32 %- 3
43.Halloween Night	38% - 3
44.Holiday Disaster	48% - 3
45.Lost In the Computer	39% - 3

46.Lost in The Forest	33% - 3
47.My Undersea Adventure	40% - 3
48.Only the Stars to Guide Us	35% - 3
49.Rescue	36% - 3
50.Snoopy, Captain of the Enterprise	30% - 3
51.Survival	33% - 3
52.Television	34% - 3
53.The Big Bubble	34% - 3
54.The Case of the Missing Mummy	28 % -3
55.The Attack of the Midnight Visitor	36% - 3
56.The End of the World	32 % 3
57.The Ghost's Revenge	31% - 3
58.The Hundred Year Old Egg	33% - 3
59.The Legend of the Dragon	30% - 3
60.The Magic Wishing Chair	35% - 3
61.The Mysterious Man Next Door	47% - 3
62.The Puppy Who Wanted A Boy for Christmas	40% - 3
63.The Tiger's Tooth	33% - 3
64.The Time Machine	38% - 3
65.The Unexpected	46% 3
66.The White Tiger	34% - 3
67.Time Capsule	33% - 3
68.Trail Bike	28% - 3
69.Treasure Island	40% - 3
70.Treasure Map	42 % -3

19 Most Difficult Topics

Kitchen Chemistry; Curiosity Killed The Cat; The Boy Who Could Read Minds; The Secret Life of Plants; I Was A Stowaway On Apollo II;The Mysterious Narfs; Why the Pollygoop Won't Forget; My Life Growing Younger; My Grandparents; Don't Forget The Trolofasts; Underwater Explorer; Mechanical Genius; The Famous Voyager; The Old Gum Tree; The Choice; Sacrifice; Marvellous Macca;Dreamtime; UFO.

Most Boring Topics

3 The Old Trunk;Smoke Jumper;Lost Keys;
6 Rabbit's Foot;Sand Dunes;Genie in the Thermos;Footprints in the Sand;Pirates;
9 Headline;A Time for Courage; My Responsibility;
12 The Banana Witch; My Most Memorable Experience;Babysitting My Cousin;
15 Fire;Bossy Boots; Life in a Caravan;
18 Cross Country;Fireworks; Goal;
21 The Day I Smashed My Bike; Circus Life; My Big Brother;
24 The Park; Adventures of a Wombat;Lizards;
27 The World's Fastest Car; Going Swimming; The Concert;
30 Bushranger;The Visitors;The Place I Go;
33 A Day in the Life of a Snake Hunter;My Life as a Telephone;The Caterpillar's
36 Secret;Bush Fire; The Adventures of Johnny Strongman; Journey's End;
39 My Life as a Golfball; Free At Last; The Basketball That Would Not Bounce;
42 Invisible Beauty; Struggle Against the Odds; Case of the Runaway Vacuum;
45 A Spaceman Came to Visit; Mr Wiffle's Sniffle; The Hot, Hot Day;

- 48 The Potato Chip That Would Not Crunch;The Most Beautiful Thing;The Cat That
 51.The Cat That Ran Away; Henry the MoMo Monster;; I Owned A Pig;
54. Visit from My Fairy Godmother;The Nicest Person I Know; How the Elephant
 Got ItsTrunk;
- 57 The Robot Who Cried ;The Turkey Who Wouldn't Gobble;The Snolofu;
- 60.The Other Side of The Moon; The Beverley Hillbillies; Drifting On A Cloud;
- 63.The Fisherman; An Exciting Trip on a Raft; Little Joe Meets a Jimgim;
- 66.A Magician I Knew Once; Trouble At Turkey Farm; Animated Animals;
69. My Worst Accident; All About Being Stubborn; My Lucky Rabbit's Foot;
- 72.The Day the Vegetables Could Talk;The Adventures of Goofus The Ghost;
- 75.Trapped; The Clock That Went Backwards; SkyDiving Adventure;

12 Most popular topics

- 1.The Day The Animals Took Over the World;
- 2.The Money Tree;
- 3.If I Had \$1000 to Spend;
- 4.The Day My Pet Learned To Talk;
- 5.Skydiving;
- 6.If You Had Four Arms;
7. Other Side of the Moon;
- 8.Revenge;
- 9.Living Dead;
- 10.Another World;
- 11.Attack of the Three-Eyed Elves;
- 12.The Fight

Appendix H: Story Samples

Sebastian

Phase A Baseline

TOPIC: LOST IN THE COMPUTER

Trapped in the computer

On a Saturday afternoon my friend and I were playing a computer game; when the computer turned itself off!

When we went to turn on the computer it zapped us into the computer.

To be let free we had to go in a race. I won the race but my friend didn't.

The person who didn't win got put into prison. I had to rescue my friend? At night I broke into the prison and freed my friend. We got a plane and zoomed into a screen. We were scidding across the floor we escaped from the computer. 102 words

Phase C: Wheel

TOPIC: TRAIL BIKE

(altered to "Motocross or BMX Bike" for 10 year old)

Motocross.

One morning I decided to go to motor cross with a few friends.

When we got there, there was a sign that said that it was closing down for repairs.

We wanted to go in. But there was no one there.

We decided to go to the Mall. We went on our my bikes.

We axadently banged into a pram. We said sorry and then - this shop keeper woman came and said to us " I new that you were going to hurt someone one day." we said to her it isn't your bisnis.

Suddenly two police officers came down to investigate the scene. They said to us what are you doing in here with these .

we said that we can't go to the Mall, we can't go to the Motocross place so we can't go. 140 words.

Phase D Baseline

TOPIC: TIME MACHINE

Time Machine

One day my dad decided to buy a computer. Dad was looking around, in this shop and I said that I was going to look at the Sony Playstasion games.

While I was looking at the Sony Play stasion games, I saw a lift tipe object.

I stood into this unushal (unusual) object and suddenly I found that I was in the county E;ept (Egypt). Tootan Carman came allong and said to me what are you doing you are supost to be working.

One day when Tootan Carman wasent looking I went to the spot were I came out off and

suddenly I found that I was still in the computer shop. I went and saw dad dad was still looking at the computers I went back into the machine and then I found myself in the time when dinoasours were alive. When I got into the contry I allmost go troden on by TREX.

so I decided to see if I could go back to my country. I kept on trying and trying but I couldnt get back. Then I jumped onto a dinsaur and reached the cloud I came I came out of, when I got up there I go back to the compter shop. 207 words

Fred

Phase A Baseline

TOPIC: LOST IN THE COMPUTER

Lost In Sim-City

One day I was playing on my computer. I was playing sim-city . When I tuchet the ~~screen~~ and I just mistirily fell into the computer. Luckliy I had just finishet billding the best city I have ever bilt on Sim-city so I gess I'm lost in the computer forever. All I got to do is mack shore that my Brother dosen't town the computer off. 69 words

Phase B Web

TOPIC: THE GHOST'S REVENGE

The Ghost's Revenge.

Every day I went to school. Every day I would get better up by the three bullies. I got my lunch money stolen every day. But one day I was in a car accident. I died. I became a Ghost. And it was time to get even with the three bullies. so every day I would go and embarrass them. By giving them the biggest wiggles you could ever see in your lifetime. I pulled down their pants in front of the teachers. I made them walk into doors, walls. I made them act like little babbies. I made them thought things at the teachers so they would get detention for a lifetime. so I got my Revenge. 122 words

Phase D Baseline

TOPIC: THE TIME MACHINE

The Time Machine.

One day there was an old man called Albert. everyone know that he was a mad scientist and made lots of things. but No one know about the time Machine he was making. He made it from metal and lots of wires and there must of been a million buttons. It only took him a week to build it. that why his a mad scientist. One day he said to me do you want to try my new time machine. I said yes. who could resist going in a time machine. Not me. 96 words

Phase D Web

TOPIC: DREAMS FOR SALE

Dreams for Sale.

One night I went to sleep like all the other nights I have gone. but this night was the most scariest night ever I was having a bad dream and I kept having them so I decided to sell them so I put a notice up and then a big sign saying Dreams for sale. no one came in until a man walked in and said I want a bad dream. well what kind of dream are you looking for a really scary one in fact I will take them all, all of them, all of them ok that will be \$10000. And from that day forward I didn't have bad dreams I had good dreams Oh well I better go to sleep now and have a good dream. 131 words

Philbert

Phase A Baseline

TOPIC: THE COSMIC ZOO

Catch the crazy animals is the aim. The cosmic Zoo is the game. Collect all the Bonuses and save all the visitors. danger Beware The animals may kill you.

Good luck. Animals include = Giraffes, elephants, hyenas, horses, penguins, crocodiles, birds, rhinos, turtles, ducks, ants, apes, big cats, zebras, fish, crabs, cows, and many many more.

56 words

Phase C Wheel (waning effects of medication)

TOPIC: WITCHES

Once upon a time there was a concrete skyscraper that scraped away at the sky all day and left a great big nick along the sky everyone did not like that so they put up a colossal reward for anyone that could stop the skyscraper from scraping the sky. All sorts of people tried to stop the scraping but failed here are a few A jackhammer tried but exploded. A truck tried but burst out. Many others tried and failed until the witches came along, all of them tried their best and failed then the last of them who happened to be the smallest ran up and kicked the tower and it fell down and squashed her flat and the sad part is the reward just barely covered her hospital bill. 131 words

Phase D Wheel

TOPIC: THE WHITE TIGER

The White Tiger

At two o'clock at the San Francisco Zoo a rare albino Siberian tiger was born on his release he was pestered by all manner of free birds. The zoo staff had to pull him and his mother out of their enclosure because of the birds it was then that the zoo staff realised it, the animals were teasing the tiger because he was different. So the zoo began a frantic search all over the world for any other albino siberian tigers of any age. The zoo was delighted to find that there was a group of albino siberian tigers in a small valley in siberia the zoo quickly made a new enclosure for the tigers and then brought 1 family of the tigers back to the zoo. When the birds saw the new family they stopped teasing. The exhibit was called The White Tiger. 147 words

Phase D Baseline

TOPIC : FLOOD

Flood

One day on Mars there was a big noise and then every body went running to the sand baggers and began filling them with just about everything they could: sand; rock; salt. Others ran to the chemical factories and started making all sorts of things: salt bricks; daiamond bricks; diamond sheets; salt pannels. It was a flood and they were preparing the city for the flood. They were making thing to use to make dykes and levies. They also had to improvise and when they did not need vehicle the drove it up to the sand bags and put up sheets and sandbags on the other side. Then the flod hit the walls they had made it went around the city and some of the walls broke open in spots. 131 words.

Theodore

Phase A Baseline

TOPIC : THE COSMIC ZOO

One fine day in the galaxy of many different animals, the stronger ones where planing a surprise attack on Saturns slimy snakes, *because these two had won most battles* and the lossier would have to be turfed out *which would mean the winner as the outright ruler. It was on the first shoot coming* from the Rynoos. They'd done it, a huge hole was left in there planet. they were forced to avacuate *so they were beaten the world* of "the cosmic zoo." 83 words & 4 syntax errors

Phase B: Web (waning effects of medication)

TOPIC: DESERT ADVENTURE

The journey had just begun. Yes it was time. Four Wheel *Driving is doing the best* and the scariest thing ever, doing skids and burnouts on the red soil reaching speeds of up to 80 kmph, wrecking *everything in its path*. 41 words & 2 syntax errors

Later session in Phase B: Web

TOPIC: BURIED TREASURE.

Buried Treasure.

One day, Fred went to the Rubbish tip with his dad While he was there, unloading the trailer, he saw something strange. It was a old bottle with a grubby paper rolled up inside it excitedly he shoved it in his pocket and couldn't wait to get home. There was different symbols on the map *but Fred reconised them from school*. He set out, it was similiar to a map of the block. *At the park was a big X* so he followed his enstinks and *that led him to a tree*. It was hollow, could it be in hear. He found a stick and smacked it across the tree *and a piece slid out*. 117 words

Phase C2

TOPIC: THE BIG BUBBLE

The Big Bubble.

He was outside the deli. It took place after school. Fred was trying to blow the biggest bubble ever. He wanted to do this because he thought it was good fun. Max was one of Fred's best friends. His younger brother Andy kept popping it. He was the biggest pain. Then they go to Max's house. While over there he blows the biggest bubble in history. The people who work at Guinness Book of records go to his house and start recording stuff about his experience with in the next issue he sees the record published. Then he tried to break other records *that were made*. He was unsuccessful. This record had never been attempted before. 119 words.

Phase D Baseline

TOPIC: THE WHITE TIGER

The White Tiger

There was a White Tiger who lived in the jungle. His house was made of bamboo with a river flowing by for him to drink. He's very hungry and very tired so he sets a trap and just sits and waits for his victim to arrive. The trap was a line of peanuts leading from the elephant village to his house. Then along it came. he jumped out and grabbed the little elephant and threw him in the house and locked the door. He felt guilty of what he'd done and decided not to eat him. so he kept him as a servant. 106 words.

Otto

Phase A Baseline

TOPIC: THE ADVENTURES OF A BANANA SLUG

LA Walk On the Wild Side

One Boring day an unsuspecting slug was walking along a banana tree when a stupid ape grasps the banana. The slug falls 5 metres and splats on the ground. Before he did that he freed a moth from a spider's web and trapped a pig for a lion's lunch. The spider was a deadly bird-eating spider. the lion was a cub. The pig was like pumba. Then he plummeted another 2 metres to the ground which had his name on it. 88 words

Final Session in Phase B Web

TOPIC: BURIED TREASURE

I'm on an ocean cruise when the captain stops the liner. He said that there are supposed to be sharks with gold necklaces just below us. I stripped off and dived into the ocean the captain yells out there is a curse after you release the ape.

I found 3 thresher sharks and found the box I forced it open. The diamond-filled Ape Carcass rose out. A great white came at me. your minds can figure the rest out. The captain saw a lot of blood come out of the water. then I popped out with a very heavy gold necklace. I was now a trillionaire. 108 words

Phase C Wheel

TOPIC: TRAIL BIKE

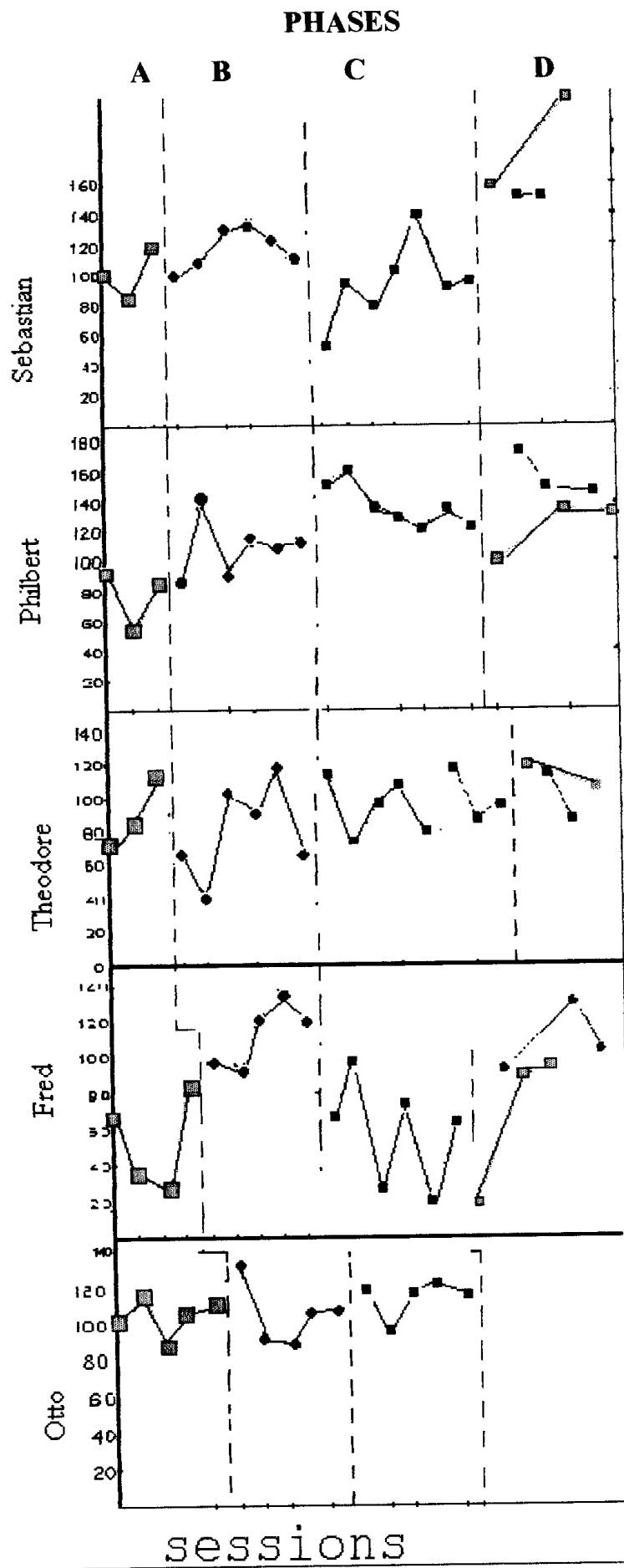
Trail Bike

It was very late at night I was in the pines with my soon-to-be friend. My name is TJ. All I want to do is wreck that stupid trail bike because it has been giving me trouble and bad luck. Combo was my friend until 1 1/2 hours later. The tree was in my view when suddenly I was jerked off my bike by Combo.

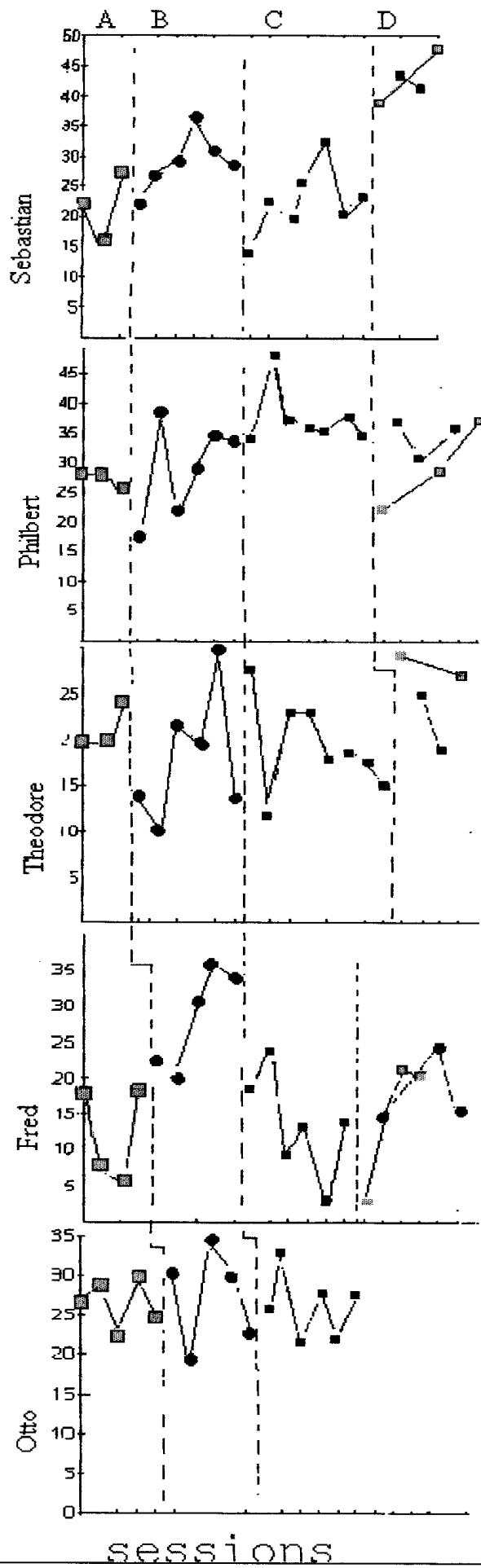
The bike did a ghostly because I was not on it and ploughed into the tree then blew up into pieces. The next day the government kicked me out of the pines for the damage to the trees. I never had to pay for that stupid bike. 117 words

Appendix I: Overview of Strategy Trends

WALTON HO ROBERT



SEBASTIAN
PHILBERT
THEODORE
FRED
OTTO



STIMULUS-YOKE TO RESPONSE

